# McGraw-Hill DIGEST

DECEMBER 1949

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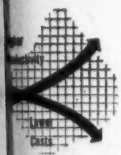

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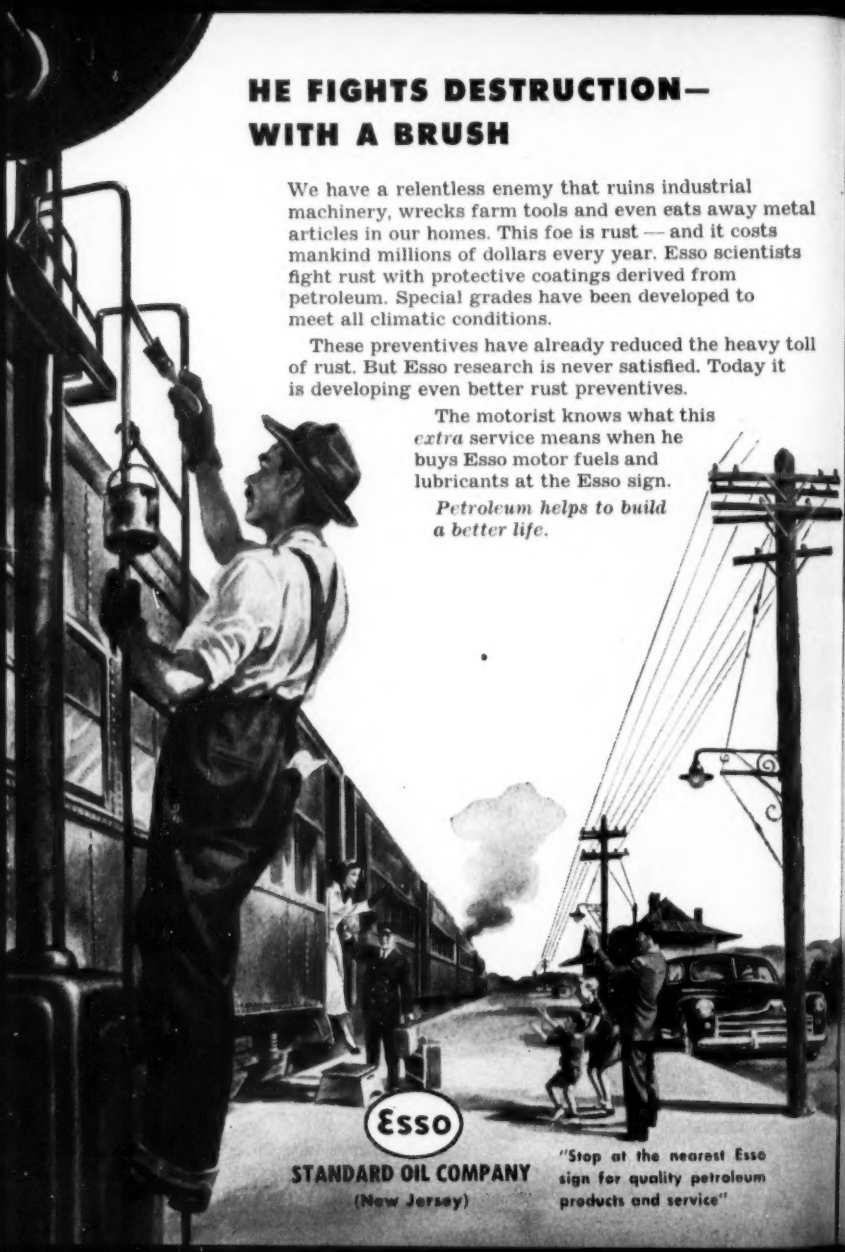

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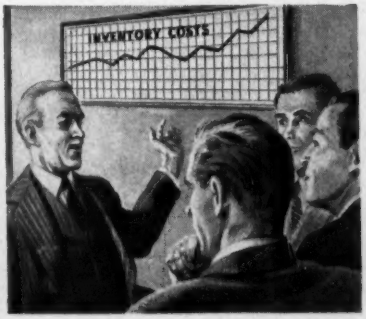

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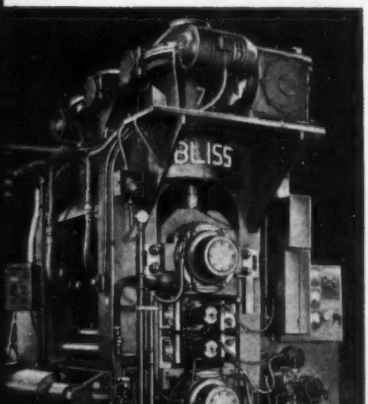
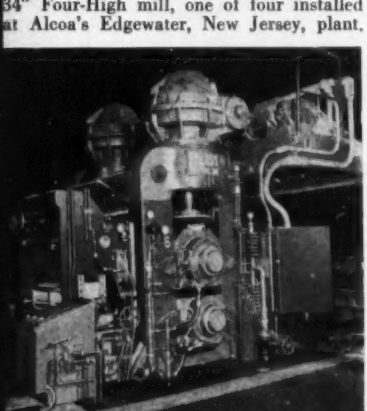



34" Four-High mill, one of four installed at Alcoa's Edgewater, New Jersey, plant.



60" Two-High mill at Alcoa's Davenport, Iowa, plant.

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1 December 1949

ear Reader,

*merican Machinist* finished its mid-century report metalworking production equipment just as the edi-ors of the Digest were closing this issue of the mag-zine. *AM's* editor Burnham Finney called the survey to ur attention and, although it was past closing date or this issue, we got it. You'll find the story on page 8 "U.S. Machines Growing Older."

ork on the survey was started in February by the *AM* taff. They sent over 50,000 questionnaires to all ranches of U.S. industry. The reports were worked over y the entire *AM* staff plus other McGraw-Hill depart-nts, including research, economics, statistical, irculation, illustration.

lants employing from 1 to 100,000 persons were checked he battery of figures -- roughly 50,000 separate en-ries -- fill 96 pages.

he *AM* "mid-century survey of metalworking production uipment" is the sixth in a series, started back in 25. It is typical of the research done by McGraw-Hill agazines to bring their readers necessary facts so that nagement may do a better job. The survey is typical f the type of stories that are digested monthly by our itors to bring in digest form these important stories Digest readers.

John F. Chapman

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# *Announcing—*

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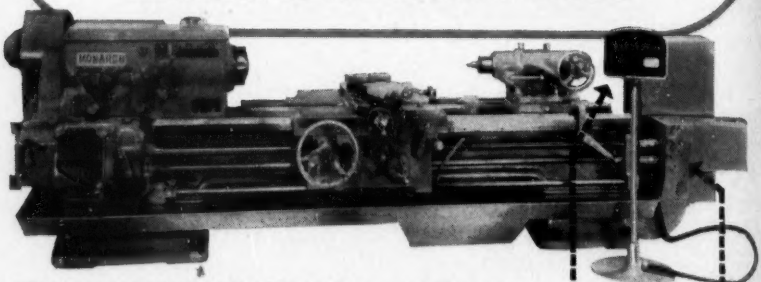

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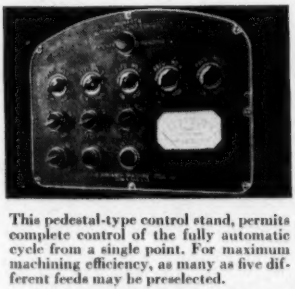
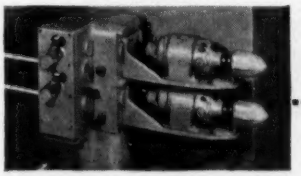
You'll want to investigate how these features and others fit the "Motor-Trace" for "*peak production at a profit*" in your shop. Be sure to ask for complete information.



This pedestal-type control stand, permits complete control of the fully automatic cycle from a single point. For maximum machining efficiency, as many as five different feeds may be preselected.



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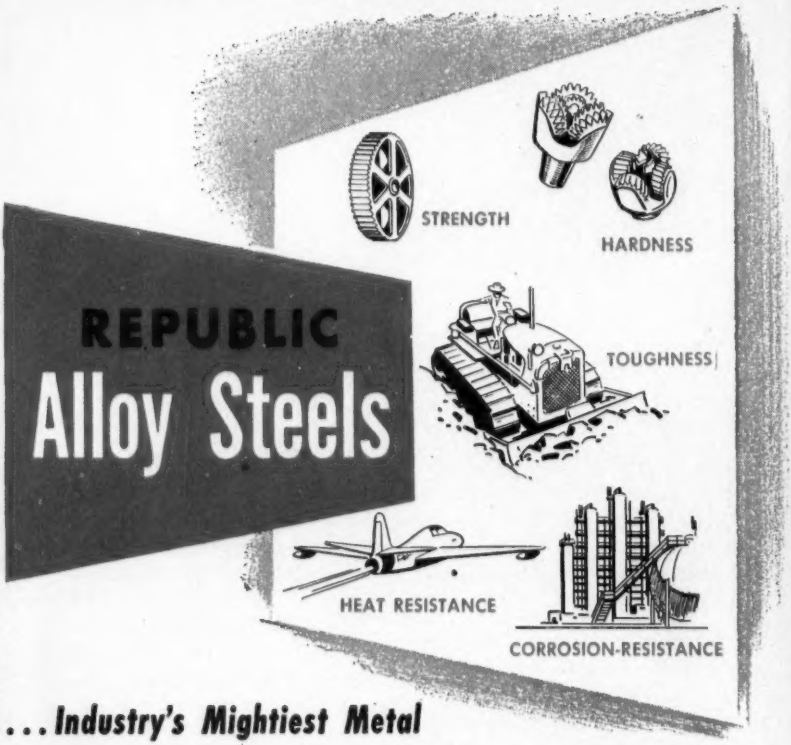


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# Business Trends

**LOOKING AHEAD INTO 1950,** the prospect is that business through winter and spring will hold the gains it has made since summer. Business will go into the new year at a high level. Strikes in steel and coal this fall—plus the slowing-down they brought other industries—mean that an important segment of business will be working against a backlog of demand for months to come. Steel operating rate, which held near 8-9% during the strike, may well stay close to 100% of capacity throughout the winter.

**Business purchases of new plants and equipment,** the key to general prosperity, are expected to be lower, but still at a high level. Totalling about $18-billion in 1948, they probably will taper off slightly next year. McGraw-Hill's survey of business plans to buy capital equipment—due about the first of the year—will give a precise estimate of 1950 trend. Any letdown, however, is expected to be offset in part by rising government expenditures, particularly military.

**More inflation is unlikely to develop** in the first half of 1950, even though it is expected by some stock-market analysists and business leaders. True, government spending is likely to produce a $5-billion deficit for fiscal 1950. Curbs on fiscal policy, on installment buying of cars and household equipment, and on credit for homebuilders have been loosened. World War II veterans will get a $2.8-billion dividend on government insurance policies, which is sure to stimulate business this winter. Some prices—notably non-ferrous metals—have gained sharply since the "recession" of last summer.

**Reserves of industrial capacity and manpower,** and surpluses of many crops, however, seem large enough to meet all demands in sight in the next 6 months. Industrial production, which was about 175 on the Federal Reserve Index before the steel strike, could be pushed to at least 195 if demand developed. In short, the prospect is that rising demand will mean continuing good business well into 1950, but not inflation. Some lines and companies can expect some rough going, as they had this year.

**ARE U. S. TARIFFS** a real barrier to trade? One answer, which runs contrary to much talk here and abroad: The U. S. market is actually among the world's easiest markets to enter. Quotas on the physical volume of products allowed to be imported are rare in the U. S., but widely used abroad. This alone makes the U. S. market among the most accessible to importers.

**Tariffs are being scaled down.** Trade agreements (latest were announced in early October after negotiations at Annecy, France, this summer) have brought the over-all level below what it was before World War I. Last year some 70% of all imports, by value, were duty free. Duties on goods subject to duty amounted to less than 15% of value. In contrast, in 1913 the rate on goods

# Business Trends (Continued)

subject to duty averaged 27%. On some products, of course, duties make importing difficult.

**Trend in tariffs is downward**—with some of the heaviest cuts expected on manufactured goods, which have made up a steadily decreasing share of total U. S. imports. State Department already is planning another round of negotiations among 40 nations next summer. Chief benefits of these Reciprocal Trade agreements go to countries exporting to U. S. They continue to use quotas and currency restrictions to limit imports, making tariff cuts a one-way benefit.

**Devaluation raised prices of American goods**—up to 44%—in most overseas markets. That throws up a hurdle to U. S. exporters that tariff concessions will not offset. Net result of tariff cuts and devaluation is to further encourage imports into the U. S. and discourage exports. Still, U. S. exports in 1950 are expected to be limited not by high prices nor by a shortage of buyers, but by a continued shortage of dollars.

**FREER TRADE** among European nations is slow in developing. Counted on by ECA economists and others in the U. S. to consolidate the gains of devaluation, a general easing of trade restrictions still seems far away. Britain lifted restrictions on about half the imports private traders buy from soft-currency nations. Benelux freed about 30% of the trade among the three countries, then postponed earlier deadline of June, 1950, for complete union. France, with its internal wage-and-price crisis, postponed its plans for freer trade.

**U. S. TECHNICAL KNOWLEDGE** behind a $650-million program is expected to double Iran's farm and industrial production in the next 7 years. Planned by Overseas Consultants, Inc., which is made up of 11 American consulting firms, the program gives priority to social improvement, not industrial construction.

**Among the first steps:** use of chemicals and drugs to fight disease and vermin, reduction of work shifts in the textile industry from 10 and 12 hours to 8 hours, and providing better methods and tools for Iran's farmers.

**The plan will require** $2-million for road construction equipment, almost $8-million for railroad equipment, more than $20-million for electric-power-plant construction, and other equipment to increase output in a wide range of industries. Most of the equipment will come from the U. S., but British, Dutch, Belgian and other European countries will compete for orders.

**OIL-REFINERY EXPANSION** plans in Western Europe may be cut back as a result of OEEC review of the program. The council has approved construction of refineries capable of processing 62.4-million tons of oil by 1952-53. But the council urged that no country expand its refinery capacity to produce a surplus for export where there is no market in sight.

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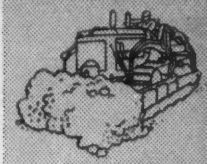

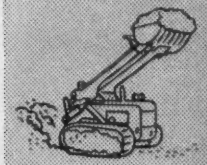

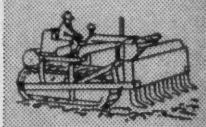

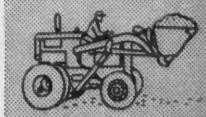

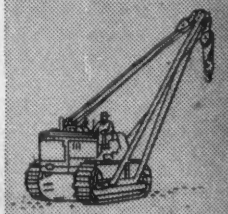

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# Washington Report

**INDIAN PRIME MINISTER NEHRU'S** visit to the United States—his first—is counted a significant political coup for the West in the cold war. Nehru, the spiritual heir of Ghandi and Liberator of India, likes to think of his nation as the "Third Force" that could bring about lasting peace. Secretary of State Acheson disagrees, believing no important nation can stay neutral.

**In informal attempts to coax Nehru** around to Acheson's logic, U. S. Ambassador Loy Henderson found himself handicapped by Nehru's misconceptions about the U. S., that it was a nation of great technological advance but without high moral and cultural standards. Thus the trip was an opportunity (1) to let Nehru see for himself and (2) to give Acheson and President Truman a month in which to push the idea that nobody can stay neutral.

**Direct political and economic deals** were not a part of Nehru's visit. Pacific Pact, blocked sterling, "Point 4", food—all these came up as topics of the day and as dinner conversation. But Acheson readily agreed when Nehru remarked that the time is not opportune for a Pacific Pact.

**Nehru went home with these things:** (1) Acheson's pledge that the U. S. would concentrate on helping India solve her food problem, (2) a U. S. pledge to support India's candidacy for a seat on the UN Security Council, and (3) Acheson's suggestion that India become the model for demonstrating Point 4.

**POINT 4 IS A PHILOSOPHY,** not a program. It is important to keep that fact in mind in interpreting Congress' failure to put through President Truman's legislation this year. Truman's own people are partly to blame. Staff work in laying out procedures for government's role in the program was slow and sloppy. The opposition expressed in Congressional hearings was largely disagreement over techniques, not over objectives. Next year, Congressional committees will work out the details.

**Meanwhile, Point 4 kind of activity is going on.** An example is ECA's technical assistance program. Also, there are the Rockefeller programs; Overseas Consultants, Inc., with its $650-million development in Iran; Stettinius associates in Liberia; and others.

**PHILIPPINE ECONOMY**—regardless of how last months' election turned out—is heading into a dollar crisis that will have serious political repercussions both in the Orient and in the U. S. Such is the judgment of State Department's economic division. Their conclusions have been laid down to Secretary Acheson—and to the Philippine government.

**Cause of the looming trouble** is that post-war U. S. rehabilitation dollars have created a statistical prosperity which has lulled the government into avoiding the

# Washington Report (Continued)

unpopular, but necessary, reforms to put the country on its feet once the relief dollars stop. Relief payments will start falling off rapidly next spring. They virtually end altogether in the spring of 1951. Running at the rate of $300-million a year since war's end, they have offset the Philippine trade deficit.

**LOOK FOR YUGOSLAVIA** to get another World Bank loan—between $10- and $20-million. It is the next step in the West's aggressive policy of supporting and encouraging Tito's anti-Soviet stand. It will be the fourth dollar credit aimed at filling Yugoslavia's trade gap left by the Russian economic blockade.

**In addition to approximately $40-million** from these four credits, Tito still can draw up to $57-million more from the International Monetary Fund at a rate of $15-million a year.

**Other examples of U. S. moves** designed to widen the Tito-Stalin break: premeditated support for Yugoslavia's successful candidacy against Czechoslovakia for a seat on the UN security council . . . easing up on export licenses, typified by approval last August of a $3-million steel mill purchase . . . approval of a Yugoslav-West German trade agreement whereby Tito gets industrial equipment.

**BALANCE-OF-PAYMENTS LOAN** of $25-million to Chile by the Export-Import Bank in October may not, as the bank claims, indicate a policy change. But it does set a precedent. Previously, the bank turned down similar applications from Brazil, Argentina, and the Union of South America. In each case, the bank ruled the loans must be for the specific projects, not balance of payments.

**You can assume this from the Chilean loan:** if a situation gets bad enough, the bank will step in to back up U. S. foreign policy and protect earlier bank investments. In Chile's case, the drop in copper prices did it.

**AFGHANISTAN WILL GET** an Export-Import Bank loan for about $15-million soon. Money will go for irrigation and limited electric-power production along the Helmand River, with increased wheat and cotton crops as the ultimate goal. Engineering and economic reports backing the loan application submitted from Kabul (with aid from Morrison-Knudson Co., Inc., a U. S. engineering and construction firm) were among the best the bank ever received.

## INTERNATIONAL GLIMPSES

**Dean Rusk will become Under Secretary of State** if his boss, James Webb, accepts an offer to become President of North Carolina University. Rusk, now Deputy Under-Secretary, is the man most embassy representatives call on.

**Maximum additional U. S. market** for crude rubber as a result of the modification of the government's synthetic use program is 52,000 tons. Actually, experts figure the increase will not amount to much more than 35,000 tons.

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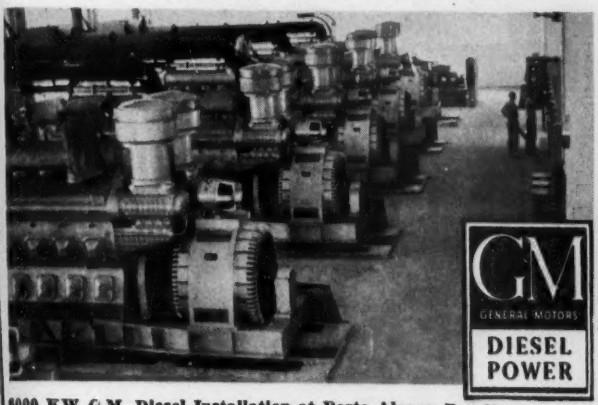


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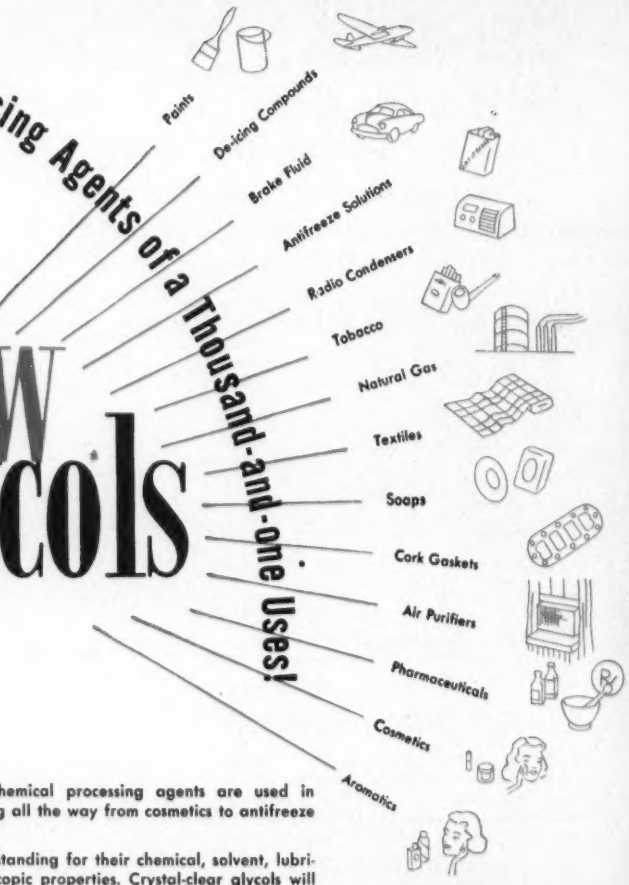
# Dow glycols

## Processing Agents of a Thousand-and-one Uses!

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# Europe Urged to Export More

**ECA investigating mission to Marshall Plan countries reports that exports to the U. S. are vital, suggests ways to increase them**

"WE MUST BUY if we intend to sell" is the theme of an Economic Cooperation Adminstration report aimed at increasing American exports from abroad. It urges certain changes in U. S. customs procedures and advances constructive suggestions to European governments and business and to U. S. businessmen.

The report faces and presents squarely the fact that the traditional excess of U. S. exports over imports has been financed by the U. S. government and its nationals.

The so-called favorable balance of trade from 1914 to 1949 amounted to $101-billion. It was offset in large part by government loans and grants totalling $68-billion, of which $49-billion were direct grants from American taxes.

The remainder was offset by over $10-billion of private remittances, about as much in long and short term private capital investments, over $15-billion sent in gold or as liquidated dollar assets, and $1-billion from World Bank and International Monetary Fund.

## Dollar Gap Widening

But now, the report claims, the dollar gap is widening because of the inability of European countries to earn enough dollars from exports to the U. S. Of various alternate courses open for correction of this situation, stimulating imports to the U. S. is urged as the most feasible.

In fact, ECA estimates that the U. S. must buy at least $2-billion more a year from Europe or see its exports dwindle to a mere trickle and living conditions abroad drop to a point endangering world peace. So it recommends first that U. S. customs procedures be simplified. Then European governments are advised to strengthen missions in the U. S., provide adequate credit facilities for their exporters; reduce and, as quickly as possible, abolish import and export controls; encourage increased production of basic raw materials; and participate in developing travel facilities for tourists.

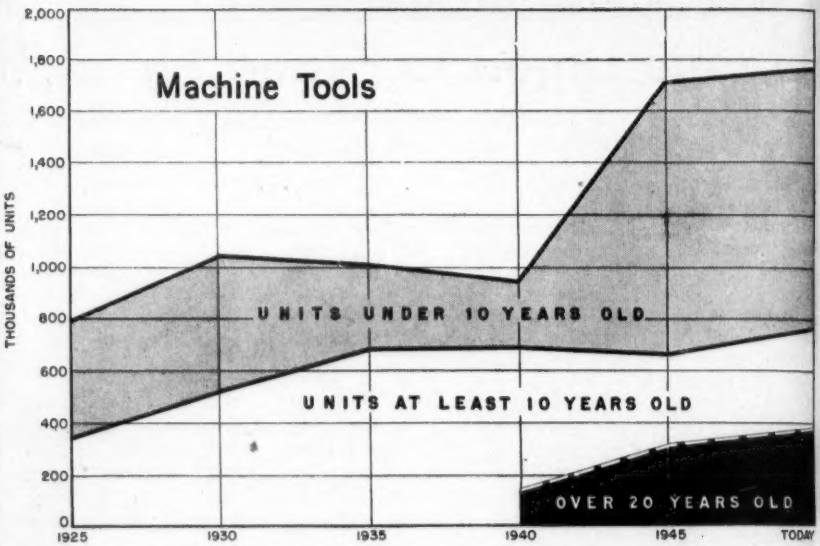
## What Businessmen Can Do

European businessmen can help, the report points out, by developing aggressive selling campaigns in the U. S. instead of waiting for business to come in. They should arrange meetings with American buyers and businessmen to exchange market information, and they should study U. S. markets and marketing methods. They should set up trade information staffs in the U. S.

Other suggestions to foreign businessmen are to maintain larger inventories in the U. S. for better servicing of repeat orders, to persuade European banks to take the lead in promoting profitable exports, and to develop procedures for subcontracting in Marshall Plan countries other than their own. They are urged to make an all-out effort to increase management-labor productivity and efficiency and to lower production costs, overhead, and prices.

American businessmen too are urged to interest themselves in greater imports. They are advised to search out European markets of semifiished products or raw materials and to reexamine European production for specialties that cannot be mass-produced economically in the U. S.

They can help too by studying distribution costs of imports, by encouraging American transportation companies to seek overseas freight, and by adopting new financing procedures.




# U. S. Machines Growing Older

**Survey of metalworking equipment in the U. S. shows that its production equipment is racing toward obsolescence—too many machines are too old**

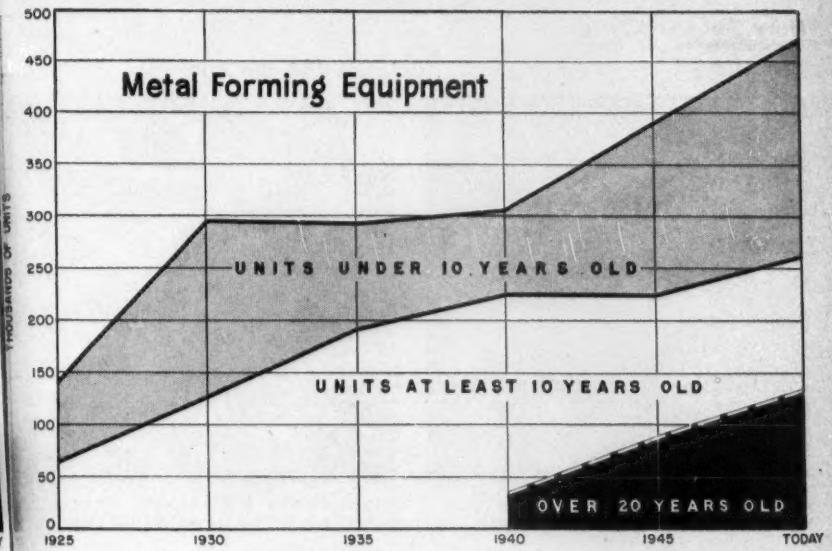
METALWORKING PRODUCTION equipment in the United States is in worse shape today than it was at the end of the war. Metalworking industries are falling behind in keeping their machinery up-to-date. These are the unpleasant general conclusions that can be drawn from the *American Machinist* mid-century inventory of metalworking equipment.

The obsolescence trend of the 1930's toward a higher average age is back. If the present trend of inadequate replacement is not reversed, more than three out of four machine tools by 1955 will be at least 10 years old.

Just what does this situation mean to world business? Briefly, these two things: First, a market is growing in the U. S. for metalworking equipment, and it will be filled by both domestic and imported machinery. Second, the competitive position of the U. S. in world markets is directly measurable by its production equipment and becomes progressively worse as that equipment becomes old and out-moded.

Here are the facts. The inventory shows that the U. S. has engaged in production work 1,762,165 machine tools, 471,257 units of metal-forming equipment, and 885,280 units of "other shop equipment". This last item includes welding machines, balancing machines, air compressors, and equipment for processing and materials handling (cranes, hoists, industrial trucks).

The number of machine tools at least 10 years old in the U. S. is at an all-time




high—759,000 units, or 43%. The same is true of metal-forming equipment with 260,132 units, or 55%, 10 years or older. Probably the 301,864 units, or 34%, of other shop equipment at least 10 years old represent a new peak also.

Altogether, 1,321,047 units are 10 years or older. This equipment has suffered from hard usage, has been outmoded by new technical developments, and represents inefficient and high-cost manufacturing practices.

Furthermore, over 800,000 machine tools less than 10 years old are of prewar design. Some designs date back to the early 1930's. At least 95% of the machine tools in use today are more than 10 years old in design.

Another measure of obsolescence and inefficiency is the 20-year-old mark. A total of 606,702 units were bought and installed before 1929. About 19% of U. S. metalworking equipment has had an average of a quarter century of use.

All these figures add up to one fact: The remarkable postwar developments—greater power, higher speeds and feeds, automatic cycles and tracer controls, automatic work handling—are being scantily applied. Last year, new machine tools installed were only 2% of those in active operation—far too few for a competitive economy.

The inventory also revealed facts and situations pointing up major trends in many industries. The automobile industry has the highest percentage of metalworking equipment at least 10 years old (53%), while the aircraft industry has the lowest (14%).

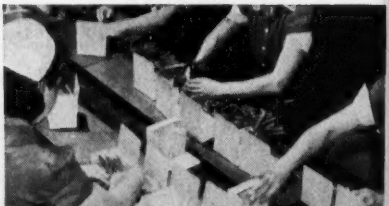
Age of equipment varies as to type. Planers are oldest—75% over 10 years old, 55% over 20 years. Other aged units include shapers, threaders, and forging, swaging, and wire and strip forming machinery. Best records are shown by rifle-working machines, pneumatic presses, die-casters, gas-welding equipment, and industrial trucks.—Am Mach, Nov 3, p129

*How To Cut Costs*

**The Old . . .**

Asparagus packing at Seabrook Farms Co. was slow—select, prearrange, and pack.

**. . . and the New**



Output is now 300% greater. Prearranged spears are belt-conveyed to packers.

# Food-Processing Cost Forum

**For the past 2 years, costs have been a thorn to U. S. food processors and have been the target of many far-reaching programs**

EXPERIENCE of six companies shows that the food processor has open to him many ways to cut costs and to increase productivity. And many of these ways do not involve spectacular equipment, just common sense and management skill.

American Home Foods, Inc., first paid attention to inventory controls over raw materials and finished products. The result—strong inventory position and reduction in storage-space requirements.

Materials handling was looked at, with the result of almost 100% conversion to palletized operations. Standard costs were developed. High waste in packaging was attacked by more rigid material specifications, elimination of oversized cartons, and tighter packed carloads.

Seabrook Farms Co., for its quick-frozen and canning operations, instituted nine projects:

1. A continuous processing line for asparagus.
2. High-speed automatic packaging lines.
3. Buckets replaced with tub trucks to bulk-handle peas and lima beans.
4. Feeding lines by gravity from tub trucks.
5. Harvesting root crops and spinach by automatic harvester-loaders.
6. Palletized handling.
7. Incentive wage payment wherever practical.
8. Production standards set up.
9. Supervisory training program.

The asparagus processing line, besides tripling original output, lowered floor-space requirements by 30%, im-

proved working conditions, eliminated use of tote pans and flat trucks, and reduced damage to asparagus spears.

Amalgamated Sugar Co. had a particularly hard situation to face. It had little control over either raw-material (sugar beet) cost or basic price of sugar, the latter being dictated by cane-sugar producers.

The solution was to lower overhead while maintaining volume. Maintenance budgets were pared and its costs studied. Inventories were reviewed. New equipment was installed. Five factories were equipped with continuous diffusers. Results—three men per crew instead of 21 men, lower coal consumption, lower sugar losses, capacity increased by 33%.

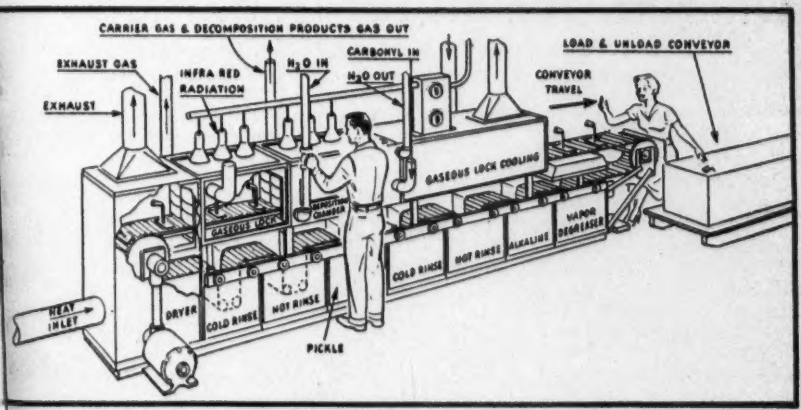
P. J. Ritter Co. started its program by setting up (1) a three-man committee on cost reduction and (2) these requirements on ideas: Will it reduce costs? Will it increase sales? In 1949?

Substantial savings have been effected by elimination of many non-working foremen and supervisors, of certain jobs, and of some unnecessary, war-borne activities.

Glaser-Crandell Co. estimates savings of 8% from closer control. Salesmen are making more calls per day. Purchasing agents are checking markets more thoroughly—and bargaining. More business of the overhead absorbing type is being accepted.

Curtice Brothers Co. looks on increased palletizing as a key point in its cost-cutting program. It also is employing strictly modern equipment on its farm operations and is placing greater emphasis on budgeting control. Particular attention is being paid to personnel training.

While the organization and operating practices of these six companies all differ, there can be recognized throughout a common approach to the cost problem —to gain better management, more efficient processing, less waste, greater productivity.—Food Ind, Oct, p41, 62

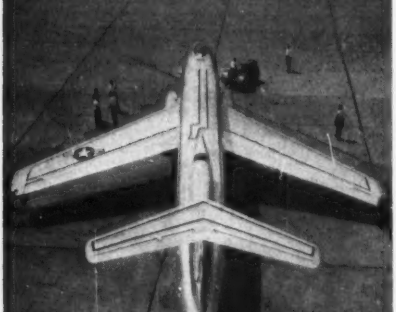



CONTINUOUS GAS-PLATING UNIT

Gas plating, by decomposition of metallic carbonyls, will be a continuous process in this commercial unit now under construction by Commonwealth Engrg. Co. Loading and unloading will be done at one end. Parts to be plated will pass through cleaning and drying sections, then to plating section. Plating gas will be jet-sprayed on parts in deposition chamber. For nickel plating, gas would be 20% $Ni(CO)_4$ and 80% carrier gas (usually hydrogen). Chamber must first be purged with inert gas.—Chem Eng, Oct, p118

***Three-Jet Fighter-Bomber XB-51 Looks Different . . .***

***. . . from Above . . .***



***. . . from Front . . .***

***. . . from Rear***

# Unique Design for U. S. Plane

**Variable-incidence wing, high tail-plane, jet mounting, tandem gear make the new fighter-bomber XB-51 a strange looking "bird"**

MOST UNCONVENTIONAL jet plane yet developed in the U. S. is the XB-51, three-jet fighter-bomber. Variable-incidence wing, mounting for two of its three jet engines, stabilizer atop tail fin, and tandem landing gear are distinct shifts from current designs.

Use of variable-incidence wings is not a new aircraft design idea. The first such wing structure was built in 1930. This wing design will permit the XB-51 to take off and land in a nearly-horizontal position, fully utilizing both landing gear units. The decided droop to wings flattens out during flight. Small, retractable wingtip landing-gear units will prevent wingtip damage during ground maneuvering.

Variable-incidence wing allows faster takeoffs and slower landings. It allows slightly higher maximum speeds by permitting fuselage to assume a minimum drag attitude while the wing is at its near zero-lift incidence.

Main objection to such wing design is the structural problem created. One wing span must be movable about the other. In the XB-51 the front span will rotate because it is more lightly loaded than is the rear span.

Two General Electric J-47 jet engines are mounted on pylons extending from each side of the fuselage. Third jet is in the tail, the air intake being atop the fuselage.

Stabilizer location avoids jet and wing turbulence at slow speeds and guarantees maximum longitudinal control when most needed.

Wing span is about 55 ft., over-all length 80 ft., gross weight 80,000 lb.—Aviation Wk, Oct 3, p12

## Practical Slime Control by Chemical Toxicants

Paper mills are caused considerable trouble by microorganisms that form slime deposits on inner surfaces of equipment. These organisms must be kept under control if the mill is to operate at high efficiency.

Addition of a chemical slime-control agent is now practiced in 75% of the American paper mills. Two general types are popular: (1) phenolic derivations such as sodium pentachlorophenate and (2) organomercurial compounds such as phenyl mercuric acetate.

Methods of applying slime-control agents differ in various mills. Chlorinated phenols give best results with "slug feeding" in the form of briquettes. A relatively high dosage is put in for a short period at regular intervals. With the mercurials, best results are usually obtained with continuous feeding.

With slug feeding, addition should be made where slime growth is most rapid. In continuous feeding into recycling systems, there is not much advantage in one spot over another.

Decision as to the point where the agent should be added depends on convenience of equipment location. Suitable places are the white water just beyond the overflow, the stock storage tank, and the fresh water.—Paper Ind & World, Sept, p684

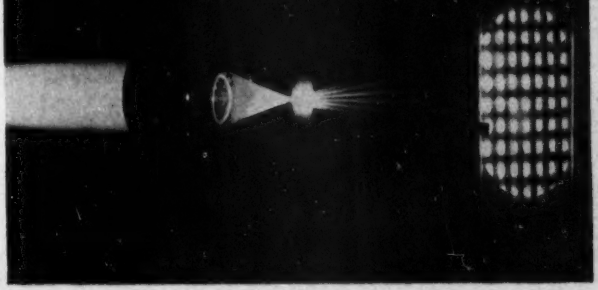
## India to Make Boilers

First major industrial boilers to be manufactured in India will be made next year by the Textile Machinery Corp., Ltd., at Calcutta. Designs will be supplied by Babcock & Wilcox, Ltd.

The factory will have about 47,000 sq. ft. of floor space and an expected production of 1,000 tons of boilers, ancillary plant, and kindred equipment. Provision has been made for eventual extension to four times the initial capacity.—Mach, Oct 8, p872

## Private Hurricane Warning

Hurricane warning system and evacuation program of Dow Chemical Co.'s Freeport, Texas, plant features use of radar and a shortwave radio hookup. Dow's system calls for a 12-hr. warning, at which partial shutdowns are started, then 6-hr. and 4-hr. warnings and finally evacuation. The shortwave system assures full communication even when telephone lines are down.—Chem Eng, Oct, p179



**ELECTRON-OPTICAL SHADOW METHOD**

Small electrostatic and magnetic fields can be studied by technique developed at U. S. National Bureau of Standards. Lens system forms reduced image of light source at point just left of wire screen (center). Image shadow on glass screen at right shows field strength by distortion. —Elec World, Oct 8, p128

## Avoiding Stock Duplication Can Save Management Money

Elimination of stock duplication offers management wide possibility for cost cutting. In large companies where different divisions buy separately, using their own parts' names and numbers, buying costs mount.

Volume-buying price benefits are lost; one division may order a part that is overstocked by another division.

Remington Rand, Inc., started a survey in 1945 to eliminate such waste for the U. S. Navy. The job will not be completed until 1952, but savings will be great. So far 15-million of the Navy's 50-million parts' numbers have been checked.

Of these, only 2-million represent actual parts; the remaining 13-million represent duplication, obsolete equipment, and the like. Remington Rand believes the 2-million numbers can be reduced to 80,825 numbers to simplify work of the purchasing section.

Remington Rand's system for standardization and simplification of ordering is based on two principles: (1) use only one number for a given part; (2) name part for what it does rather than what it is.

As an example, the Navy buys a pump that has identical screws in two places. One screw costs 10¢ as a replacement part, the other costs 5¢. Yet the Navy buys the same screw as a standard stock item by the barrel at a cost of 0.7¢ per screw.

Elimination of duplication will reduce ordering red tape and permit reduction in office force.—Business Wk, Oct 1, p32

## Inclosed Jig Cuts Dye Costs

Inclosed dye jigs appear to be the answer to low dyeing costs for small dye lots. Jigs are old but inclosed ones are new. Jig itself permits cloth to be kept flat and in a smooth condition. Jigs have permitted use of vat, indigsol, sulphur, and neophthol dyes on almost all types of cotton cloth.

Inclosed jigs can handle from 50 to 1,500 yd. of cloth. Metal hood top—either rounded or of flat, sectional construction—confines both heat and vapors and maintains an even temperature. There is less danger of bad selvages resulting. Chemical consumption is reduced. Hoods are equipped with drains to remove condensate thus eliminating dye-drip on cloth.—Textile World, Oct, p120

## Squeeze-Bottle Dispensers

Polyethylene squeeze-bottle dispensers are finding wide use as containers for deodorants, cosmetics, wave set, insect repellants. Over 100 products are merchandized in the self-dispensing containers. Unbreakable, the polyethylene container can be formed by blow mold or injection methods. Dispensing principle is the same in all bottles.

A length of extruded capillary tubing extends nearly to the bottom of the container. Upper end terminates in a triangular grip in cap. When bottle is compressed in short, sharp squeezes, liquid rises in tube and is dispensed as a spray. Orifice is offset to minimize dispensing of product in liquid form.—Mod Packaging, Sept, p76

## "Frozen-Heat" Cutlery

A secret "frozen-heat" process employed by Robeson Cutlery Co., Inc., is reported to make stainless-steel knives so superior that they need no sharpening for 3 years. Steps in the new process include a superheat treatment, followed by deep freezing.

Knife blades are said to be heated to a temperature below the melting point, quenched in oil at 140° F., and placed in a chamber held at an extremely subzero temperature. After the freezing period, blades are stress-relieved, cooled, and tempered.—Steel, Sept 5, p77

# Loads, Unloads Bricks Fast

**Special truck body by American Truck & Body Co., mounted on a Dodge chassis, permits driver to load 2,000 bricks in 10 min., unload in 5 min. —Cons Meth & Equip, Oct, p49**

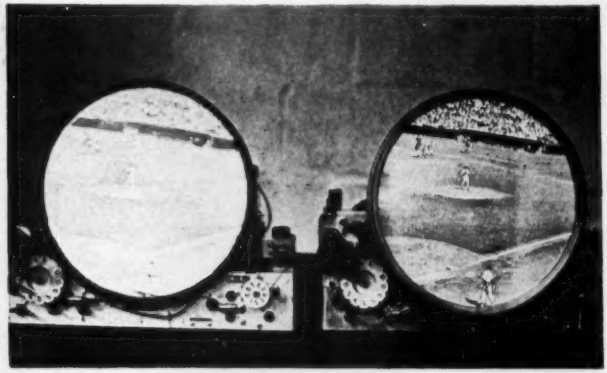
**1** TRUCK is backed up to stack, and empty brick body is tilted. Driver continues backing truck until. . .

**2** BODY SLIDES around stack. Bricks are stacked normally except for soldier course. On ground behind soldier course. . .

**3** HOLDING BAR is clamped by heavy nuts and bolts to each side of body to hold bricks during tilting and travel.

**4** TRUCK FRAME is braced to relieve strain when load is raised. Air bag at corner of body is expanded for extra grip.

**5** CLAMPING BAR above soldier course is visible here. Truck is ready to roll. To unload, procedure is reversed.



**BUILT-IN FILTER**

**Television tube at left with clear glass face has low contrast ratio when viewed in lighted room. Tube at right has Teleglas face and contrast ratio of 35:1. Made by Pittsburgh Plate Glass Co., it is featured in Zenish Television receivers in 12- and 16-in. metal tubes. — Electronics, Oct, p122**

## How to Maintain Interest in Plant's Safety Program

The basic aim of a safety program is first to make the plant a safe place to work and then to teach the men to work safely. The second part of the job is the harder because it involves maintaining interest in safety on the part of the workers.

Personal contact is a most effective factor. This is the job of the foreman or group leader. His efforts, directed by superintendent and safety director, should be bolstered by safety posters, contests, and plant newspapers.

In using posters, some points should be watched. No poster should be left in one location. Posters should be changed once a week. Home-made posters can be as effective as fancy, bought ones. Blackboards at suitable locations can carry chalked messages.

Safety competitions between departments stimulate and hold interest. Department standings should be well publicized. A prize can be given for the best record over a stated period. But the safety program itself must not be spasmodic.

Variety can be introduced by changing the emphasis—one month on leg injuries, the next on safety glasses, and so on. Shifting emphasis to one phase will not bring neglect to others.

An Allis-Chalmers plant, for example, found that in a safety-goggle test other injuries were reduced 67%.—Am Mach, Sept 22, p107

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## Enzymes Aid Paper Coating

Starch dispersions, when applied as adhesives in paper coating colors, must have the required strength and flow readily at desired concentrations and temperatures. Untreated gelatinous starches are strong enough, but are far too viscous.

Treating starch dispersions with enzymes reduces their viscosity. The two general types of converting, or amylolytic, enzymes are alpha amylases and beta amylases. The first one reduces viscosity by liquefaction and conversion to maltose or sugar.

A new process of preparing paper coating colors consists of converting starch with an enzyme in the presence of minerals and pigments. Coating colors can be prepared at exceptionally high solid contents. The process produces maximum dispersion of minerals and pigments and greater efficiency of starch adhesive.—Paper Ind & World, Sept, p740

**BUS-TRUCK COMBINATION**

**Designed for low-density passenger and freight traffic routes, this Kenworth Motor Truck Corp. bus-truck combination carries both passengers and freight. It seats 17 passengers; cargo space is 18 ft. long and 8 ft. wide—Am Auto, Nov, p44**

## Worsted Spinning System Uses New Drafting Assembly

A five-step method for producing worsted yarn from top eliminates use of cans, cap bars, and nebs. The Saco-Lowell Shops system introduces a new ball creel and drafting assembly.

Two processing methods are available. For wools up to 6 in. long, a pin drafter is used, followed by two passages of 3-over-4 drawing, a single passage of roving, and spinning. For wool longer than 6 in., three passages through the pin drafter are recommended, followed by roving and spinning.

The pin drafters and drawing frames deliver to balling heads rather than to cans. Static bar removes charges from slivers emerging from drawing frame front roller. The new drafting assembly is used on roving and spinning frames. Simple adjustments permit rolls to work through full range of commercial wools. —Textile World, Oct, p155

## Autothermic Cracking

New process, Autothermic Cracking, should prove valuable to gas companies and the petrochemical industry. It will reform propane or other volatile hydrocarbons in admixture with air to make gas to meet emergency peak loads. It also will crack ethane, converting it to ethylene.

Developed by Universal Oil Products Co., the process consists of preheating air and hydrocarbon streams separately, mixing while hot, and reacting in a small insulated vessel. The mixture is rapidly converted to reformed gas and nitrogen.

Autothermic Cracking has been tested in pilot-plant operation, producing 1,000-2,000 cu. ft. of gas per hr. Over-all thermal efficiency is better than 98%.—Chem Eng, Sept, p200

## Build Sewer from Inside Out

In extending its sewer system 1,966 lin. ft., the city of Honolulu has saved $25,000 by using 42-in. tile-lined, cast-in-place pipe instead of precast, tile-lined pipe. The system was built from the inside out.

First, concrete cradles were poured in the excavation. A circular support form for tiles was placed, and tiles were put in using a synthetic rubber compound of putty consistency. Tiles were held in place by metal clips. Then reinforcing steels and forms were installed and concrete was poured around tiles.—Eng News-Rec, Sept 29, p35

# Device May Make Type Obsolete

**Using an electric typewriter, memory unit, counter-justifier, and photographic unit, new machine may become standard composing machine**

PRINTING FROM MOVEABLE TYPE may become an obsolete art if the new electronic device for typesetting proves as successful as its initial prototype has been. A joint development of Lithomat Corp. and Graphic Arts Research Foundation, the machine is several years away from commercial production.

The machine has four basic parts: an electric typewriter, a memory unit, a counter-justifier, and photographic unit. Operating the typewriter keyboard actually encodes the characters, which are stored by the memory unit. The justifier takes into account the space required by the characters typed. When the line is completely typed, the operator pushes a key that actuates the counter-justifying unit so the line is flush right and left.

As the next line is typed, the preceding line is scanned and sent to a perforated glass disk containing the letter or number. When the proper coded character arrives, a beam of light is triggered by a photocell, the light passing through the disk to a photographic film. So accurately are the disk and light synchronized that the characters are accurately spaced on the line.

The developers claim many advantages for the unit over standard methods of composition with moveable type:

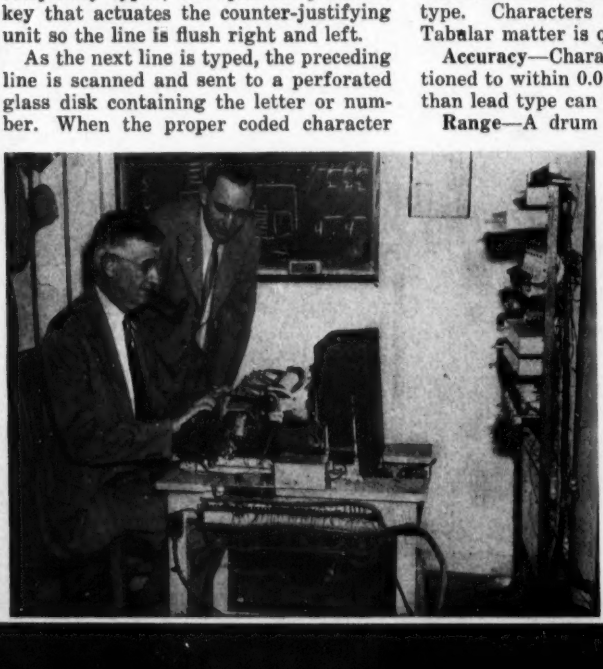
**Speed**—Experimental model "sets" about 20 newspaper lines per minute, three times the speed of typesetting machines. Operating the unit from tape—as with a teletype—instead of a keyboard would increase this speed.

**Versatility**—There are no vertical or horizontal limitations as there are to lead type. Characters can be overlapped. Tabular matter is quick to set.

**Accuracy**—Characters can be positioned to within 0.0005 in., infinitely finer than lead type can be positioned.

**Range**—A drum will replace the disk in a new machine and will carry 20 fonts of type. Lenses will permit 18 possible sizes from each font. One operator can thus select from 3,300,000 characters.

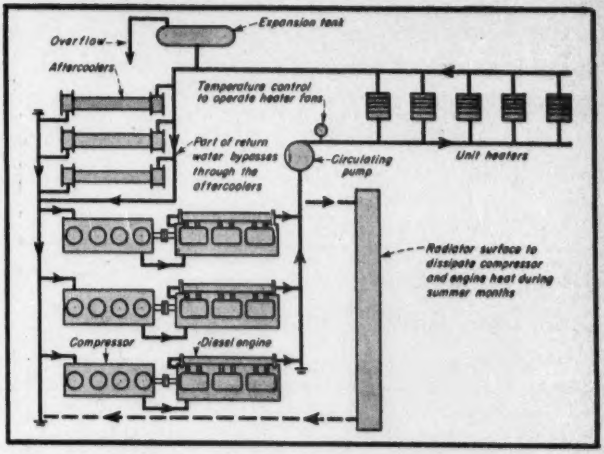
**Simplicity** — Any electric typewriter can be used. Only settings necessary are type size and length. The operator sees the line before it is photographed, thus reducing errors.



***DOCTOR Vannevar Bush operates the electric typewriter, the first step in typesetting with Lithomat Corp.'s new machine.***

### HOOKUP FOR HEAT RECOVERY

**Waste heat recovered from air compressors and diesel engines goes to unit heaters at Schramm, Inc.'s plant. Engines are equipped with marine-type water-cooled manifold feeding hot water into common manifold, then to unit heaters. Part of water returns through aftercoolers to cool the compressed air. Rest of water returns direct to compressor intake head. Expansion tank gets rid of air trapped in system.—Power, Oct, p100**




**Clarity**—The photographic image is much sharper than a type reproduction. Resulting printing plates will be cleaner.

No one knows what the device will cost. Developers say it will be "inexpensive." They do know, however, that type set by the machine will cost less than that now composed on standard type-setting machines.—Business Wk, Oct 1, p57

## Reduces Bearing Costs

A stable film of graphite, 0.00015 to 0.0005 in. thick, can now be applied to metallic and non-metallic surfaces.

Graphite coating is sprayed or dipped on wearing surfaces, then baked at 600° F. Film life depends on loads and bearing pressures. Tests show that surface wear life can be increased 3-10 times the normal on parts subject to high bearing loads.

Another advantage is that the film eliminates need for bushings, anti-friction bearings, plating, or fluid lubrication. Originally developed to meet 2000° F. temperature conditions in airplanes, the method is being adapted to surfaces subject to galling at normal and sub-zero temperatures.—Prod Eng, Oct, p158

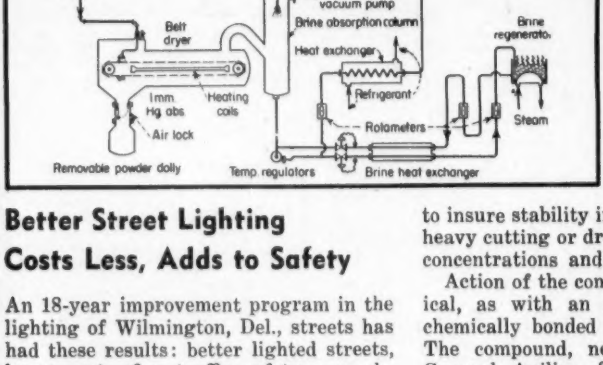
## Prepacking Food Helps Sales

Five years ago the Great Atlantic & Pacific Tea Co. tried prepacking of fruits and vegetables in its Columbus, Ohio, chain store. Prepacking was done in one corner of the warehouse. Now the operation has expanded until it occupies an entire building. Consumer acceptance has been good. Produce costs no more than items sold in bulk and trimming has cut waste.

For the storekeeper, prepacking aids store cleanliness and smoothness of traffic through the store. Under refrigeration, produce life is lengthened.—Mod Packaging, Sept, p71

## Gasoline From Coal Cheaper

Unlimited quantities of premium gasoline could now be produced from coal at a cost no more than 3-4¢ per gal. more than current gasoline prices according to a U. S. Bureau of Mines report. Sale of byproduct phenols could lower price still more. Report estimates that a commercial plant of 30,000-bbl. daily capacity would cost $248- to $258-million.—Coal Age, Oct, p168




**HIGH VACUUM BELT DRYER**

**Heat- and oxygen-sensitive products are dehydrated at low temperatures on this dryer. Refrigerated brine is employed to condense and remove the water from the vacuum.—Food Ind, Sept, p40**

## Better Street Lighting Costs Less, Adds to Safety

An 18-year improvement program in the lighting of Wilmington, Del., streets has had these results: better lighted streets, lower costs, five traffic safety rewards.

Business and heavy-traffic streets have 10,000-lumen luminaires on spacings of 75-125 ft. Other streets are lighted with 6,000-lumen units at 100-140 ft. Applied illumination varies from 50 to 100 lumen per lin. ft. Effective lighting ranges up to 1.75 ft.-c. per sq. ft.

Unit lighting costs over the 1931-49 period have decreased from $18.50 to $8.50 per 1,000 lumens. Total costs have declined about 14.8%, while the amount of light delivered increased 83.6%.

The safety record has been gratifying. Traffic injuries in 1948 were under those of 1933 despite a state-wide increase of 15% and 100% more motor vehicles.—Elec World, Sept 24, p88

## Coolant Prevents Corrosion

A new chemical compound, known as Emulphor STH, has all the cooling effect of plain water in metal-cutting operations, yet prevents corrosion of machine and work in dilutions as low as 0.2%. It is an outgrowth of a German process.

In low concentrations, Emulphor STH gives a clear emulsion that is stable even in hard water. In concentrations as high as 1½%, the emulsion also is clear but may need 0.04-0.07% sodium carbonate to insure stability in hard water. Extra-heavy cutting or drawing requires higher concentrations and mixing with oil.

Action of the compound is not mechanical, as with an oil. Its inhibitor is chemically bonded to the metal surface. The compound, now in production by General Aniline & Chemical Corp., is composed of: 42-50% inhibiting agent, 45-50% Mepasin oil, and 5-8% water.—Am Mach, Aug 25, p87

## Homemade Iron Lung

Muncie, Ind., needed an iron lung. And it needed it fast as the poliomyelitis (infantile paralysis) epidemic mounted. So Excel Mfg. Co. made one—in 10 hr.—and then began to improve it almost immediately.

Two 50-gal. alcohol drums, a Sears Roebuck vacuum cleaner, and ingenuity made it work. Drums were welded together, armholes and windows were cut in the sides, and lengthwise rails for the bedslide were welded inside the drums.

The bed was made of plywood, flanges were built up of steel plates, and sponge rubber served as gaskets. The vacuum cleaner was hooked to the lung through a rotary valve to provide alternating positive and negative pressures.

Pressures are recorded on a manometer made of a long piece of neon-sign glass tubing. The manometer liquid is water, colored with merchurochrome. A numbered scale gives pressure or vacuum in both inches and centimeters.—Iron Age, Sept 22, p79

## Improved Nodulizing Alloy Reported as Safer, Cheaper

Two recent announcements, one by the U. S. Navy and the other by Electro Metallurgical Div. of Union Carbide & Carbon Co., has focused interest on the development of nodular cast iron (see McG-H Digest, Aug, p36).

Navy research has shown that an alloy containing 8% magnesium in a 50% ferrosilicon carrier has certain advantages over use of other nodulizing agents. It is cheaper than cerium and less hazardous than metallic magnesium.

Another advantage is that the new alloy acts both as a nodulizing and an inoculating agent. Use of other alloys requires a subsequent inoculation treatment with standard graphitizing inoculants to prevent mottled or white iron and to develop best microstructures and mechanical properties.

Holding-power tests were made of treated metal held in a crucible in a gas-fired furnace. No loss of nodulizing power occurred in castings poured 16 min. after treatment.

Electro Metallurgical has announced the availability of a magnesium-ferrosilicon alloy. It contains 7-10% magnesium, 43% silicon, and the remainder chiefly iron. Present cost is 15 cents a lb.—Steel, Sept 5, p53, p82

## Car Inspects Railroad Track

A fleet of 20 Sperry detector cars tests 200,000 railroad track miles a year. This mileage includes most of main-line trackage in the U. S.

Moving at 12 mph. the test car passes a heavy low-voltage current through the rail, setting up a magnetic field around the head of the rail. Searching coils, suspended above the head of the rail, detect any variation in magnetic field caused by defects.

Both rails are tested simultaneously, so two complete sets of testing equipment are in each car. Current source is a homopolar generator.

When a defect is found, its presence is recorded on tape in the indicating system. At the same time, a paint gun fires a spot of pain on the rail web at the location of the defect. Further hand tests may then be made.—Electronics, Oct, p66

## Worsted High-Draft System

Adaptable to any type of worsted-spinning frame, ring, cap, or flyer, regardless of size, the Ambler system permits drafts of 100. Designed to lower drawing costs, the system uses heavier roving. Spinning costs are reduced by lowering creeling to a negligible amount. System was developed by Prince-Smith & Stells, Ltd., England.—Textile World, Oct, p158

LIGHT MAINTENANCE EASED

Southern California Edison Co. has found this truck-mounted crow's nest ladder almost a necessity in servicing street lights. Ladder, made by Los Angeles Ladder Co., rotates 360°, operates with handwheel brakes on rotation and elevation, and is off-center mounted to provide more room in truck body. It folds over truck cab for traveling. —Elec West, Sept, p87

# Advance Oil-Well Drilling

**Past few years have seen new developments in oil-well drilling equipment and practices. Reviewed are the most important**

RECENT DEVELOPMENTS considered the most important in oil-well drilling include:

1. Unitization and portability of drilling rigs and equipment.
2. Better-quality steel for drilling equipment.
3. Improved equipment and machinery design.
4. Improvement in drilling muds.
5. Better understanding of hydraulics in mud streams.
6. Proper application of weight on bit and of rotating speeds.

**Unitization and Portability**—Present high operating costs of rigs place a premium on speed. So any time saved in tearing down, moving, and rigging up results in appreciably lower costs. Savings up to 50% have been made from well-planned layouts and properly designed and equipped rigs.

**Better Steel**—Improved steel quality has added to permissible hole depths. Deeper wells introduced temperatures and pressures that former steels could not handle.

For example, SAE 4340 nickel-chromium-molybdenum steel is being tried for drill pipe and tool joints in deep-well experiments. It already has proved suitable for casing. A string of 7-in. casing of SAE 4340 was recently set at 19,765 ft.

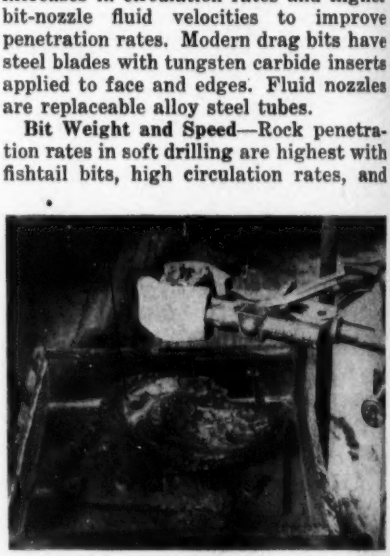
**Improved Equipment**—The trend to deeper drilling has also resulted in taller, stronger derricks. Another effect has been the use of heavier (1⅜-1½ in.) drilling wire lines, thus providing a greater factor of safety.

In power plants, there is a trend toward use of internal-combustion engines. A variety of units up to 750 hp. is available. They are readily controlled with combinations of air clutches and hydraulic drives. Diesels are popular.

**Drilling Muds and Hydraulics**—Recent developments are (1) wider applications of oil-base muds in well completions and (2) wider use of starch muds, sodium silicate muds, carboxymethyl-cellulose, and others in areas that cannot be drilled with natural or lightly treated muds. Heaving shales now are no barrier.

In drilling soft to medium-hard formations, most important developments are increases in circulation rates and higher bit-nozzle fluid velocities to improve penetration rates. Modern drag bits have steel blades with tungsten carbide inserts applied to face and edges. Fluid nozzles are replaceable alloy steel tubes.

**Bit Weight and Speed**—Rock penetration rates in soft drilling are highest with fishtail bits, high circulation rates, and



**AN OYSTER DIES**

Heartbeat of an oyster slowly dying in salt-water environment simulating that produced by industrial pollution is studied by this astreodynamometer. Instrument's action is based on mechanical motion of a probe changing a-c. impedance of two coils in Wheatstone bridge circuit. This carrier-type d-c. amplifier can be applied to other measurements involving small movements.—Electronics, Oct. p128

high nozzle velocities in combination with moderate weight on the bit and moderate rotating speeds.

In drilling medium or moderately hard formations, high speeds—up to 400 rpm. —in combination with high circulation rates increase penetration rates substantially. In hard rock, best practice is a combination of high weight on bottom with moderate circulation rate and normal rotary speed.

Other developments are use of diamond-core bits on extremely hard formations, improvements in side-wall sampling equipment, advances in mud logging, introduction of geochemical and fluorographic logging, and better cementing equipment.—Oil & Gas J, Sept 22, p56

## Helps Solve Scale Problems

To supplement time-consuming chemical analyses of boiler scales, Hall Laboratories now uses a spectrograph in solving water-treatment problems. Deposit constituents can be identified in a few minutes.

Samples are burned in a d-c. arc at 5000-10,000° F. The heat breaks down all compounds into their elements. Most are gases at such temperatures and, by means of the spectrograph, are observed as a series of lines or are recorded on film for further study.—Power, Oct, p102

## Permanent Facilities Placed As Coal Mine Is Advanced

No temporary facilities are installed at Jefferson Coal Co. in developing new workings. Instead, permanent drainage system is installed; main air course is scaled, arched, and gunited; main haulage ways are graded and permanent heavy track is laid. With these permanent installations, the crew produces 20 tons of cleaned coal per man-shift.

Main entries consist of four headings —one inbound track, one outbound track, and two air courses. Crossovers between tracks are made each 2,000 ft. Doubleheading room entries are turned off at 470-ft. intervals. Rooms 18 to 22 ft. wide are worked on each side, 2,150 to 2,800 ft. deep. Pillars 6 ft. thick are left between rooms, and every sixth room is left unmined to provide solid-block barriers and facilitate recovery of timber and track.

Two crews recover rails, timbers, and other materials. Recovery of the 15-ft., 50-lb. or larger rails used for crossbar timbering is 90%. Support post recovery is the same. A locomotive and 100 ft. of ¾-in. rope is used to pull down the crossbars. Before placement, crossbars are drilled for attachment of rope.—Coal Age, Oct, p96

*How To Cut Costs*

## About Cost Cutting This Month

**This issue brings you three in our series of cost-reduction articles—"Food Processing Cost Forum" on page 20, "Better Working Conditions" on page 36, and "Radio-Receiver Manufacturing" on page 44.**

**Don't be scared away because you may not be in food processing or radio production. There are many practical ideas here for anyone who runs a business, whatever kind it may be, or for anyone who pays a payroll.**

**And next month, there will be more suggestions and ideas on management methods, construction, design, food processing, metalworking, mining, power generation, textiles, and other processing industries.**

# Technical Shorts

**Boost Shuttle-car Efficiency**—Shuttle-car time was increased and maintenance reduced at Old Ben Coal Corp. by a year's test of airplane-type single-disk brakes on shuttle cars. No brake failures occurred in hauling 96,132 tons of coal. Brake failure down-time was cut 80%. A soft-cushion braking action is provided in contrast to quick-grabbing action of conventional brakes.—Coal Age, Oct, p108

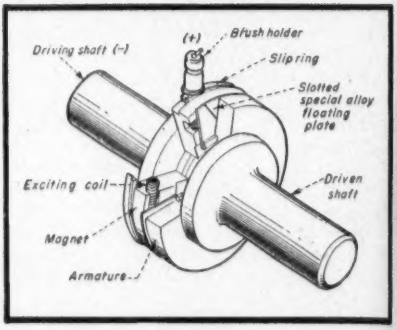
**Why Planned Maintenance**—Light maintenance should be done at regular planned intervals. Depreciation in light output of fluorescent lamps is about 38% after 6,300 hr. of continuous service. Dirt further reduces output by 7-10 footcandles between cleaning intervals.—Elec C&M, Oct, p46

**Oils Three Rolls**—Three spinning rolls can be oiled at once with an ordinary oiler with a modified spout. Two additional tips can be soldered to spout in form of a fork, spacing being equal to roll spacing. —Textile World, Oct, p174

**Eases Top-shelf Storage**—Reaching merchandise on top shelves of narrow-aisled storage areas is facilitated at Hoover Supply Co. by a shelf ladder running on a ceiling trolley in the center of the aisle. Top shelves on either side of the aisle can be reached easily.—Ind Dist, Oct, p98

**Perchlorethylene Sterilizer**—H. J. Heintz Co. now has a canned-food sterilizer that employs perchlorethylene instead of steam. Its boiling point is 249.8° F., so temperatures high enough to process practically any canned food can be attained with low pressure.—Food Ind, Oct, p36

**Anchors Boxcar Bulkheads**—Simple, inexpensive bulkhead anchors, used by the New York Central Railroad, consist of a 2½-ft. long, 2-in. tubular steel bent at a right angle. One end is flattened and drilled to take five nails. Other end is secured to bulkhead by three steel strap cleats, loose enough to permit slippage for use in 8½-ft. and 9-ft. 2-in. boxcars. Flattened end is attached to side and floor by double-head nails.—Railway Age, Oct 1, p38




FLOATING-PLATE CLUTCH

**High-permeability floating plate provides good magnet contact between operating faces of new electromagnetic clutch and brake units. Plate is between dish magnet and armature. It gives shortest path for flux lines and, being softer than mating parts, it is easy replacement part.—Elec World, Oct 8, p128**

**Tests Jet Engines**—Giant blowers to give the equivalent of 700-mph. speed and atmospheric equipment to simulate 65,000-ft. altitude and −67° F. will test jet engines at Navy's Mercer Field aeronautical laboratory. Engines will be subjected to most extreme flight conditions.—Power, Oct, p102

**Rumor Has It . . .**—Detroit is whispering that two of the big three automobile manufacturers have on their proving grounds experimental cars equipped with fluid magnetic clutches. If successful, units probably would be less costly to manufacture than torque-converter transmissions. Prod Eng, Oct, p113

**Magnesium Wall Forms**—Magnesium wall forms weighing less than 3 lb. per sq. ft. are being tested by Symons Clamp & Mfg. Co. Lightweight makes for portability. The 3/16-in. plate gives a smooth finish. Forms will not rust and are highly resistant to corrosion by alkalies in the concrete. —Cons Meth & Equip, Oct, p51

**Special Hoppers Cut Handling Costs**—Special hoppers, called a "gon-tipper," at Saginaw Steering Gear Div., Genertl Motors Corp., have cut handling costs and made work easier. Fork truck carries gondola load to production area. Gondola is placed in hopper and tilted, giving operator an ample supply of parts within easy reach.—Factory, Oct, p144

**Corrosion and Carelessness**—Two hundred refrigeration-system accidents, covering pressure-vessel and piping failures, were analyzed as to cause. Chief causes: 34.7% corrosion, 21.7 carelessness, 9 freezing, 7.9 each for defective welding and materials. —Oper Eng, Oct, p45

**Portable Bus Bar**—Johnson Bus Lines uses a portable snack-bar-ice-box combination for charter parties. Bar is loaded into bus through emergency door, occupying the space of one double seat. Water supply feeds to sink by gravity.—Bus Trans, Oct, p74

**Unusual Hydrogenation**—New installation at W. C. Hardesty Co.'s plant has a hydrogenation process unusual in two respects: (1) it utilizes fatty acids instead of commonly used glycerides and (2) it gets its hydrogen from dissociation of anhydrous ammonia.—Chem Eng, Oct, p67

**Electrically Smoked Meats**—Mid-western locker plant smokes meat electrically with no open flame. Smoke is made by heating wood chips by small range burner. A 100-w. thermostat is adjusted so chips smoke but do not burn.—Elec World, Oct 8, p134

**Refrigerator Notes**—Color and music while the housewife works. Frigidaire strikes a new fashion note with deluxe interiors of cool, clean-looking Iceberg Blue. General Air Conditioning Corp. has mounted a radio in the door of its 4½-cu. ft. model.—Elec West, Sept, p93

Torch Cuts 68-in Steel—The powder-cutting process is well-suited to cutting scrap having considerable cinder and slag. Its primary function at Colorado Fuel and Iron Corp. is cutting large buttons and skulls for scrap. Mounted on a turntable unit and transversing carriage, powder torch can make continuous cuts through 68-in. thick steel.—Welding Eng, Sept, p45

**Waterproofing Celery Band**—Chiselli Bros. are using a heat-sealing, coated, high-strength paper label for celery stalks. It does not become unsealed during refrigerated-water baths. The 3-in. band is printed with water-insoluble ink that carries the thermosealing compound.—Mod Packaging, Sept, p75

**Bronze-welded Mine Track**—Electrical resistance of mine rails can be reduced greatly by bronze-welding of rail joints. Advantages listed for bronze-welding include: smoother ride; less wear and tear on axles, motor, housings; elimination of loose joints; safer, faster main-line haulage; low cost.—Eng & Min J, Oct, p102

**Biggest Boring Mill**—What is perhaps the biggest boring mill in the world has been built in England. Swing is 50 ft., cross-slide weighs 47 tons, each toolholder has an 8-ft. down feed, and the table can carry loads up to 100 tons. The main drive motor is 125 hp.—Am Mach, Sept 22, p99

**Fools Calculator** — Electronic calculator, Edsac, at Cambridge University carries out involved computations with 3,500 tubes on 120 panels. But it can be fooled. When set to multiply a series of numbers by zero, it tries on and on until turned off or until a tube fails.—Electronics, Oct, p124

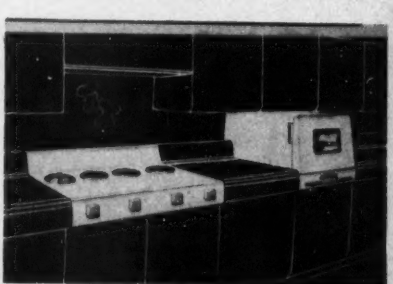


**TABLE-TOP BURNER, OVEN**

**Clean exterior styling and functional design are combined in this table-top burner and oven. The two are separate units. Design follows current trend toward more crowded living conditions. Units can be designed to fit standard kitchen workplaces. Elevation of oven eliminates stooping. Design is by Jean O. Reinecke.—Ceramic Ind, Oct, p66**

*How To Cut Costs With*

# Favorable Working Conditions

**Good lighting, color schemes, conditioned air, noise and vibration control, and exterior landscaping seem trivial, but have a direct bearing on costs**

FACTORY ENVIRONMENT is made up of seeming trifles. But they affect directly your production and costs. If factory environment does not encourage good work, production drops and costs rise. These important environmental elements include lighting, painting, air conditioning, noise conditioning and vibration control, plant architecture and landscaping.

Actual evaluation of these factors is difficult. It is hard to determine just how much each adds to the total picture. Only if conditions previously were bad and have been improved can a company statistically prove what the improvement has meant in added productivity.

### Good Lighting

Most important element of good lighting is intensity, measured in footcandles. Range for good industrial lighting is from 5 to 50 ft.-c. and in some cases to 100 ft.-c. The table shows foot-candles recommended.

These lighting levels are suggested for general lighting only. Supplementary lighting of higher intensities will be needed in certain instances. Intensities of 200 to 500 ft.-c. or higher are desirable for precision work.

Foot-candles are not the sole indication of adequacy. Quality lighting is necessary. Factors governing quality are: amount of direct glare, amount of reflected glare, brightness contrast, and color content. Glare is not controlled by using low-intensity bulbs, but rather by placing high-intensity bulbs at the right level and shielding them properly.

General lighting sources should be above the horizontal line of sight. Supplementary lighting units may, by necessity, have to be placed below the eye-level.

Reflected glare is caused by shiny surfaces. This is hard to overcome. Proper placement and shielding of lighting fixtures will help. So will proper selection of colors and finishes.

High brightness contrast should be avoided. Bright fixtures should not be hung under dark ceilings. For good see-

ing conditions, brightness of immediate surroundings should be no less than one-third that of the visual task.

Color of the light is of not too great importance in most industrial plants. But in some jobs color is highly important, such as in color-matching jobs. Color-content effects are mostly psychological and esthetic.

### Color Dynamics

Functional use of paint in a plant will minimize visual fatigue, promote safety and high productivity. Before a proper color job can be done in a plant, equipment must be arranged in an orderly fashion and lighting should be sufficient. Good painting cannot overcome the handicaps of poor lighting alone.

Where indirect lighting is employed, reflecting factor of the ceiling should be 85%. With direct lighting, greater leeway toward lower values are possible. If light is a more critical factor than color, a white or near-white light can be used. Where color is more important, ivory, tints of blue, yellow, or green are best.

Certain jobs require light from below. The floor, in these cases, must contribute to proper light diffusion and reflection. Light grey and light green are colors best suited for this purpose. Otherwise, medium grey is the best color for floors.

### Air Conditioning

Properly conditioned air is a necessity rather than a convenience in industrial plants. The American Society of Heating and Ventilating Engineers includes the following in its definition of air conditioning: (1) temperature control, involving heating and cooling; (2) moisture control, accomplished by humidifying and dehumidifying; (3) air movement, through distribution and ventilation; (4) air cleanliness, achieved by filtering.

Heat should be varied with the type of work being performed within the plant or plant areas. In warehouses, 55° F. may be adequate. Semi-sedentary jobs, such as small assemblies, require more heat since there is little bodily movement. Temperatures should be between 70° and 72° F.

**Recommended Standards for Industrial Plants**

| Seeing Tasks | Minimum Light Intensity |
|---|---|
| Safe movement of persons, intermittent manual tasks | 5 foot-candles |
| Loading, packing, shipping, warehousing, general processing | 10 foot-candles |
| Ordinary physical tasks, drilling, riveting, handling bulk materials, glasing, enameling, checking, sorting, cleaning and grinding castings | 30 foot-candles |
| Medium inspection, general assembly, general fabrication, maintenance, fine grinding, and beveling | 50 foot-candles |
| Small assemblies, fine bench and machine work, buffing, polishing, high-speed work, fine inspection | 100 foot-candles |

In hot weather most people operate best at temperatures cooled to between 78 or 80° F., possibly to 82°.

Optimum temperatures mean nothing unless humidity is considered. With atmospheres heated to 72° F. 97% of the people feel most comfortable with relative humidity about 30%. In mild weather, humidity may be raised to 40% and in cold weather lowered to 20% if the building contains single-glass windows and 30-35% if doubleglass.

Most summer air must be dehumidified. Some manufacturing operations require a high or low moisture content. In these cases human comfort must give way to technical requirements.

To be of maximum comfort, condi-

tioned air must be distributed throughout the entire work space. Temperatures should be kept uniform throughout the work area. Temperature difference between floor and breathing level should be kept at a minimum. Drafts must be avoided. Air movement of 25 fpm. is best, it should not reach 50 fpm.

In low-occupancy areas, two changes of outside air per hour are sufficient. Heavy occupancy requires two to five changes per hour. Industrial odors, tobacco smoke, fumes, number of people, and room characteristics affect the number of changes of air necessary for proper ventilation.

### Noise and Vibration Control

Noise reduction and vibration control are closely related. Noise is airborne. Vibration is transmitted through machines, floors, and other facilities.

Noise in many cases is unavoidable. Irregular noises are just as distracting as continuous high noise levels. Generally, a noise level over 50 decibels is annoying while 90 dc. can be harmful to the ear. In the average office, noise level is 45 dc. A reduction of 10 dc. from any level is equal to a reduction in loudness of 56%. A further reduction of 6 dc. reduces original intensity 73%.

Most obvious way to reduce noise is at the source. Quietness should be a factor in ordering new equipment. Good maintenance of machinery will keep noise level down. Noise occasionally can be isolated, at least noisy machinery and equipment can be isolated. If not, sound-absorbing materials should be used.

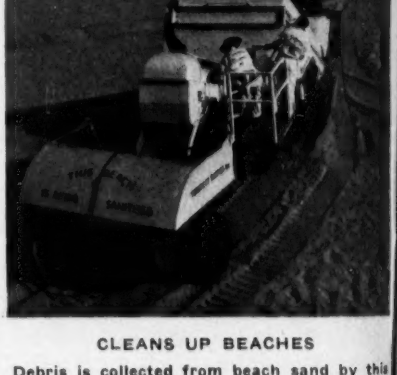
Ceiling and wall sound-absorbing materials absorb 30 to 90% of the sound, depending upon type of material. Conical-shaped disks about 14 in. in dia. are hung from the ceiling 10 to 12 ft. above the floor in many industrial plants to reduce noise. One cone per 5 sq. ft. is adequate.

Some machines today are designed so that vibration is held to a minimum. Proper installation, operation, and maintenance will assist this design feature. Troublesome machinery may be set on a concrete platform separate from the building foundation to reduce vibration. Other equipment can be mounted or suspended by rubber, cork, felt or steel-spring isolators.

### Exterior Beauty

Landscaping enhances the appearance of the plant. Before a new employee knows his way around within the plant, he is conscious of the exterior. A good exterior impresses him favorably, as it does an old employee.

The landscaping should be continuous, not merely in front of the office area. The investment is paid off in additional pride in one's plant. Plants today are being decentralized. New buildings are being built away from congested industrial areas. This trend permits more and more attention to be paid to the outside appearance of the building.—Factory, Oct, p66



**CLEANS UP BEACHES**

**Debris is collected from beach sand by this mobile sand-cleaning machine, developed by Stephens-Adamson Mfg. Co. The unit cleans a 6½-ft. wide strip at the rate of 1¼-mph. Stripping off the top layer of sand to a depth of 9 in., the unit handles 2,000-3,500 sq. yd. of sand per hr. One man operates cleaner.—Eng News-Rec, Aug 11, p80**

TELESCOPING CONVEYOR SPEEDS MATERIALS HANDLING

This 16-gage steel conveyor can be extended to a length of 10 ft. or compressed into a 54-in. length. Where space is limited or a traffic area must be crossed, the section may be placed between two permanent conveyor installations. Skate-wheel type has a riding surface 12 in. wide, ball-bearing aluminum roller type has a 15-in. riding surface. Conveyor will carry 75 lb. per sq. ft. It is a Maguire Machinery Co., Inc., development.—Factory, Oct, p152

## Casting, Prestressing Makes Extra-Strong Concrete Pipe

Prestressed concrete pressure pipe, 54 in. by 16 ft., is being laid on a waterline relocation project near St. Louis. Pipe is formed by: (1) roller-compaction of dry, high-strength concrete in a mold to make a core; (2) wire-wrapping core spirally to prestress it in two directions; and (3) covering the wire with air-applied mortar. Pipe is extra strong, withstanding three times the load required of sewer pipe.

Joints are of rubber-gasket type with steel bell and spigot. Inside sealant is a plastic filler; outside is a cement mortar.

Pipe core is centrifugally made by Rocla roller suspension method. Water-cement ratio is extremely low; spinning speed is comparatively slow. Core walls are 3 in. thick for standard sections, some being 4 in. thick. Cores are reinforced by a cage of welded wire fabric to resist handling stresses prior to wire winding.

In pouring, centrifugal force flattens concrete smoothly in core. Pouring takes 30 min. Bell end is poured first, then spigot end, and last the body. This order assures solid concrete at joints.

Prestressing is done on a wire-winding machine. Wire is 8-gage, cold-drawn high-carbon wire. A ¾-in. layer of concrete mortar is sprayed over the prestressing wires.—Eng News-Rec, Oct 6, p24

## Fast Oil-Well Drilling

Turbine oil-well drilling holds great promise as a general substitute for, or complement to, conventional rotary drilling. Experience indicates it can drill a faster, straighter hole with less wear on drill pipe and rig.

On the Gulf Coast, a rotary rig drilled to 5,000 ft. in 4 days, or at a rate of 1,250 ft. per day. In the same area, a turbine drill showed an indicated capacity of 2,500 ft. per day. It drilled from 1,242 to 3,248 ft., or 2,006 ft., in 26 hr.—Oil & Gas J, Sept 22, p161

## Expendable Oxygen Mask

Expendable oxygen mask that will provide a constant flow of oxygen for 4-5 hr. has been developed by the Air Materiel Command. It is effective up to 25,000 ft. Mask consists of a porous paper face piece, a bellows made of .01-in. Pliofilm, and a plastic tube connected to the plane's oxygen tank. Mask costs about $0.25.— Aviation Wk, Oct 10, p39

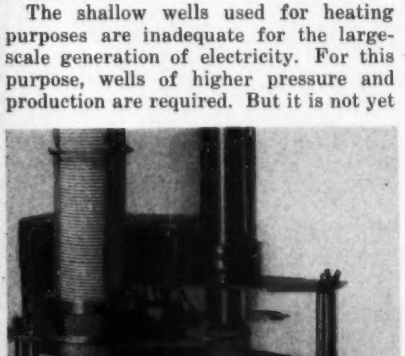
## No Coal, No Oil—Drills Steam and Hot-Water Wells

Drilling for steam and drilling of hot-water wells are two unique jobs being done in Iceland. Hot springs and steam holes are abundant there. Only U. S. Yellowstone National Park, Tuscany in Italy, and Rotorua in New Zealand have comparable thermal activity.

Shallow steam wells, 100-500 ft. deep, can be drilled economically with the cable-tool method. These wells produce 5-15 tons per hr. of steam at 5-10 psig. Shut-in pressure is 30-70 psi. Steam cost is about 2-4 cents per 1,000 lb.

In recent years, about 90,000 ft. of hot-water wells have been drilled. Most of the wells supply the hot-water supply for domestic heating in Reykjavik. They produce 4,200 gpm. at a mean temperature of 188° F.

The shallow wells used for heating purposes are inadequate for the large-scale generation of electricity. For this purpose, wells of higher pressure and production are required. But it is not yet clear whether it will be possible to generate electricity by natural steam at lower prices than by the hydro-power so abundant in Iceland.—Oil & Gas J, Sept 22, p191



FILLS ICE-CREAM CUPS

**Ice-cream servings are factory-packed by Golden State Co. Serving is dispensed onto plate by pressing cup bottom. To prevent its sticking to cup, ice cream is frozen unusually hard, then packed in this machine. As portion leaves filling spout, it is cut by two electrically heated wires. Filler is made by Redi-Serv, Inc.—Food Ind, Oct, p84**

## Bus Line Cuts Road Trouble

A survey of vehicles of the Savannah Transit Co. showed a large percentage to be over 10 years of age and though vehicles were providing satisfactory transportation, cost of maintenance was excessive. The long-range plans for fleet and shop modernization instituted after the survey have reduced road trouble greatly.

First step was to replace all "old" vehicles. With more than 50% of the fleet "new" units, it was possible to reduce the shop force from 80 to 52 employees. A preventive maintenance program scheduling inspections at intervals of 1,500, 3,000, 60,000, 85,000, and 150,000 mi. was instituted. Major maintenance starts at 60,000 mi. At 85,000 mi. engine is given semi-overhaul and at 150,000 mi. a major overhaul.

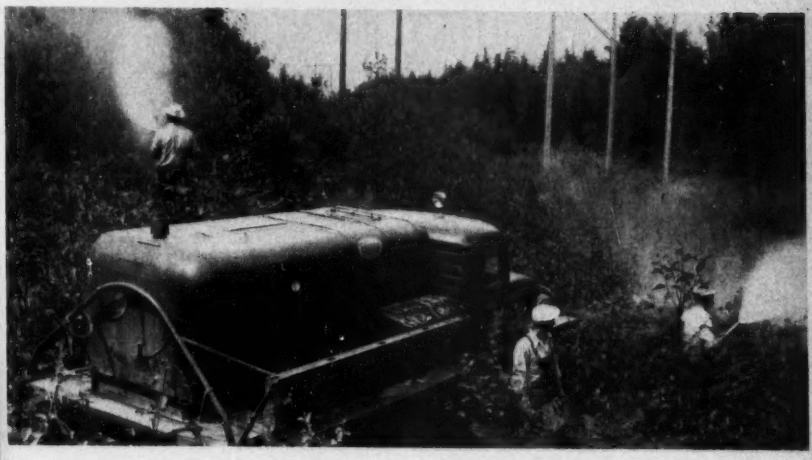
Vehicle time lost in shops has been cut from 590 hr. to 200 in one year.— Bus Trans, Oct, p66

## Home-Building Research

Home construction materials and methods are under investigation at the University of Texas. Seven homes with identical floor plans but built differently will be used for several years in the research program.

Four different research phases will be studied: (1) thermal charactertistics of various materials and methods, (2) relative comfort characteristics of living spaces, (3) comparative performance of several cooling systems, and (4) comparative performance of several heating systems.

Another objective is to attempt to design a foundation suitable for bentonitic clays.—Am Builder, Oct, p122



*TRANSMISSION-LINE right-of-way is kept clear of brush by spraying with chemical solution at a saving of two-thirds over former cutting and burning method.*

# Chemical Controls Brush

**Power utility now travels rights-of-way with chemical spraying outfit consisting of a pump, engine, and hose, all mounted on a 2-ton truck**

THREE YEARS' EXPERIENCE with chemical brush control has proved its usefulness to Puget Sound Power & Light Co. Brush along its transmission-line rights-of-way always has been a problem, particularly as growth is prolific in the U. S. Northwest.

The utility now believes that chemical control has many advantages over cutting and burning. Spray-treatment costs are running about one-third that of hand clearing.

A rig was chosen that would travel the greater portion of the rights-of-way and still be fast enough on highways. The spray pump is a 25-gpm., 700-psi. Friend pump, driven by a 16-hp., four-cylinder LeRoi gasoline engine. The whole unit is mounted on a 2-ton truck and handled by a 5-man crew.

The chemical spray used is Esteron 44, a product of Dow Chemical Co. It contains 44% active 2,4-D as an ester along with a wetting agent. It is harmless to animal life, non-corrosive to equipment, and easy to handle.

For brush spraying, dilution is 400 to 1. Spraying is concentrated on brush not over 10-12 ft. in height. An overdose of chemical is wasteful, but enough must be applied to cover the plant thoroughly.

In dense foliage where the operator must pass through the growth to cover the back side, he should spray on his way out so as not to knock the spray from the leaves. The hose must not be dragged over sprayed brush.

In spraying, there is a tendency to miss the tops of bushes and tips of higher limbs. To overcome this, the operator first wets the growth from underneath, then sprays over it so a rain-like fog settles on the top parts.

At first it was believed that good re-

sults could be had only during spring and early summer. But on woody vegetation at least, good control can be gained by spraying any time that leaves are on the trees and until they start to turn color in the fall. Areas sprayed in September last year seemed to be as dead as those sprayed in July.

The chemical is not equally effective on all woody growth. Best results were obtained on alder and willow trees.

Maple and cottonwood seemed least affected by the 400:1 solution. Doubling the concentration gave a better kill on maple. Any waxy leaf sheds the chemical before complete absorption takes place.—Elec West, Sept, p86

## Musts for Machinery Makers in Packaging Export Goods

Four hazards to goods shipped in export are (1) moisture, (2) inadequate packaging, (3) bad handling, and (4) unsuitable storage before, during, and after transport. To these can be added a fifth that accounts for more losses than all others combined—theft and pilferage.

Risks are the same as prewar, but conditions have changed. Ports are handling materials slower, goods have had to wait for ship space, open storage is now the rule rather than the exception, and more expensive machines are now being shipped in export.

But these problems can be solved by using some thought in packaging. Each machine is a separate case and deserves a container made especially for it. Special attention must be paid to packaging of pilferable items, such as small tools and workshop instruments.

Remember—a broken box is a temptation. Even knot holes attract pilferers. But theft can be prevented by use of fully seasoned lumber, cement-coated or etched nails, steel strapping, and internal battens.

Goods should always be packaged to prevent movement in the case. Machinery should be bolted to a base. Cast iron should be protected from stresses and cushioned against shock. Preservative should be used wherever needed.—Mach, Sept 24, p794

**HANDLES BIG DIES**

**Draw dies up to 32 tons are moved in and out of presses at Studebaker's new press department with an Automatic 60,000-lb. lift truck. Drag chains on each side of platform pull dies on or off the platform. Fender die shown can be replaced with another heavy die in ½ hr.—Am Mach, Oct 6, p141**

## Safety Tests Cut Accidents

Revere Copper & Brass, Inc., has devised a safety test composed of 57 test panels depicting right and wrong ways of performing tasks. Evaluation of situations depicted is based on common sense and knowledge of specific company safety regulations. The company has found that its accident rate has dropped 31% since the tests were started. The addition of the tests was the only major change in the over-all company safety program during this period.

First section of the test is devoted to general safety, second part to piling and carrying, third to use of tools. The tests conserve energy of safety director, check efficiency of instruction, arouse employee interest, eliminate the untrackable employees, and measure employee accident proneness.—Factory, Oct, p135

## Future Pipeline Technical and Economic Developments

While pipe-line design and operation in the petroleum industry have been constantly improving, there is more to be done. In fact, so many chances for improvement exist that several predictions can be made.

1. An inhibiting substance will be developed for gasoline lines to give a permanent skin effect to the inside of the pipe.

2. Pipe will be made at a reasonable cost with a stainless outside surface. This will eliminate the need for pipe coatings and cathodic protection.

3. Gasoline pipelines are now employing batch filtering to remove water and sediment. The future will see continuous and better filtering.

4. Continuous operation will be made more efficient by remote-control pump stations—possibly to serve as automatic boosters between main stations.

5. Internal-combustion engines of higher thermal efficiency will be developed.

6. Better pump units will be available. The multi-cylinder variable-stroke type, for instance, is coming more into use.

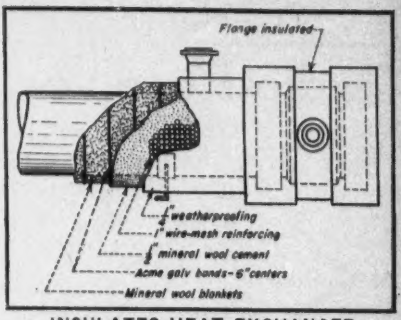
7. Above ground construction of station piping will be more popular.

8. Station design trend will be directed toward continuity of service, plus initial cost, fuel economy, and low maintenance expense.—Oil & Gas J, Oct 6, p185

## Compressed-Air Stope Filling

Pneumatic stowing system used at the Grund mines in Harz, Germany moved up to 30 tons of 2- to 3-in. fill materials per hr. over a distance of 100 meters. Chief disadvantage of the sytem was the excessive amount of compressed air needed to operate the blower.

Stowing unit was mounted on mine-car wheels. Fill material entered a hopper atop the unit and was fed to a pneumatic chamber below by rotating vanes. Waste was blown through flanged pipes to stope. Angular waste was found to be easier to move than flat types. At elbows of pipe, tangential jets boosted material flow and acted as a cushion to reduce abrasion.—Eng & Min J, Oct, p101




INSULATES HEAT EXCHANGER

**Insulating power-plant heat exchangers can save 90% of the waste heat. First, clean surface, then apply mineral-wool blankets to surface and secure with bands. Trowel on ½ in. of mineral-wool cement. Stretch 1-in. mesh galvanized wire netting over dry cement and cover with ¼-in. coat of asphaltic weatherproofing for outdoor service.—Power, Oct, p111**

## Simplifies Fender Drawing

Drawing front fenders has always been a problem to the automobile industry, taxing even fine deep-drawing steels. Pontiac Motors Div., General Motors Corp., has developed a new method for forming fenders—preliminary formation of the nose section in the blank before blank is placed in the drawing die.

A special machine notches the nose; then notched end is brought together into a conical shape. This is done by a vertically moving ram, the seam welding roll being traversed upwardly while guided by a track to weld joint securely. Only a single drawing is then necessary to produce the finished fender.—Auto Ind, Oct 15, p36

*How To Cut Costs in*

# Radio-Receiver Manufacturing

**Advanced production ideas, given in the form of case histories, can be adapted to other plants besides those making radios**

COST REDUCTION in the manufacture of radio and television receivers is accomplished by the same general methods applied in other industries. A vital element of any effective program is the reduction in direct-labor and direct-overhead costs by improvement in manufacturing processes.

Methods improvements in operations can often be attained by simple expedients. Sometimes by a change in operation sequence, equipment may be used as is. In other cases, slight changes or simple devices can produce greater operational productivity and justify themselves in savings created.

In one U. S. plant, solderers on incentive pay were making 800 joints per hour during the first hour or so in the morning. Then production dropped.

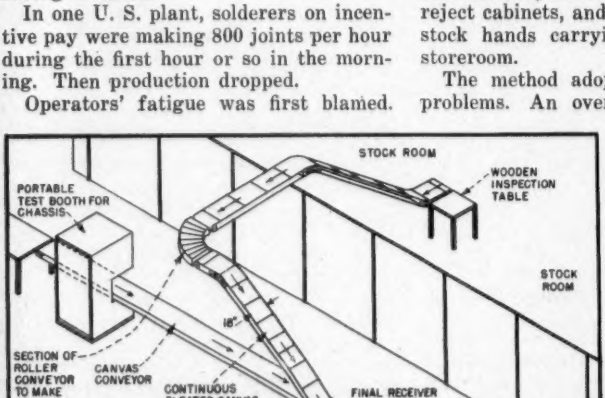
Operators' fatigue was first blamed. Later it was discovered that at high production more heat was pulled out of the iron than the heating coil could replace.

A larger iron was tried, but its heaviness caused fatigue and lower production. Final solution was a soldering apron made of asbestos and sheet metal. It had troughs to hold three light irons.

As soon as one iron cooled off, the operator immediately exchanged it for a hot iron. Production rose to 900 joints per hour. Cost reduction was 63% in labor and unit overhead.

Another large manufacturer was troubled by cabinet rejects occupying final-assembly area. The situation was costing about $7,000 a year because of (1) plant space wasted, (2) additional time used by final-assembly operator to reject cabinets, and (3) full time of two stock hands carrying cabinets back to storeroom.

The method adopted solved all three problems. An overhead conveyor runs from inspection table inside storeroom to final-assembly line. Rejects are kept in storeroom, not sent out to assembly. Conveyor speed is synchronized.




***CONVEYOR** brings radio cabinets from stockroom to final-assembly line eliminating storage of rejects in working area. Another cost-cutting idea shown here is the portable test booth on chassis conveyor. Built on a pallet, booth can be moved to any production line by hand-lift truck. Booth is well shielded by copper mesh.*

with that of the assembly conveyor. Amortization time was 4 months.

Flexibility in plant layout permits inexpensive changes in setup whenever demanded by style, design or sales trends. In a new plant to manufacture table-model radios and a-m., f-m. and television sets, flexibility in relocation of assembly lines was desirable because of such possible changes.

Lighting and electrical installations govern flexibility to a great extent. So trolley duct was installed throughout in parallel lines 10 ft. above the floor.

Fluorescent fixtures were hung on the duct, either parallel and below one duct or at right angles between two ducts. Cost was one-third that of a permanent installation.—Electronics, Oct, p86

## How To Cut Processing Costs by Reducing Glass Breakage

Notable savings in food processing plants can be made by reducing breakage of glass containers. Breakage causes are internal pressure, thermal shock, impact, and twist (as when the closure is applied too tightly).

Original glass strength is high but is reduced by as much as 90% by severe service. Main cause of reduced strength of bottles is scratching—by sharp guide rails, exposed screw-heads, worn and roughened indexing turrets, defective conveyor chain, worn bottle rests on semi-automatic or hand-operated equipment, and sharp separating triggers.

Here is how one mayonnaise packer reduced breakage from 1 jar every 44 min., or 0.02%, to 1 jar every 9 hr. 53 min. Jars were dumped out of cases onto a hard-surface horizontal plate at the head of the production line. This dumping table was redesigned so it could be tilted 45°, permitting gradual, easy dumping.

Next it was found that line pressure caused by starting speed was excessive in relation to that created by discharge speed. As a result, the jars would grind against one another. So the discharge rate of the unscrambler was slowed down to reduce line starting speed.

Finally, minor causes of breakage, such as incorrect closure torque and rough indexing wheels, were corrected. —Food Ind, Oct, p52

**RE-REFINES LUBE OIL**

**Automatic unit removes carbon, acids, water, and dirt from diesel crankcase oils by catalytic process and complete filtration. Made by Automatic Oil Refiners, Inc., it has capacity of 100 gal. per 8-hr. shift.—Oper Eng, Oct, p68**

## Paints Inside Machines

A British machine-tool maker paints inside surfaces of machines with bright-yellow oilproof paint. The light color improves visibility inside the housings and makes assembly and maintenance easier. The yellow paint is better than white paint as it does not look so dirty. —Am Mach, Oct 6, p153

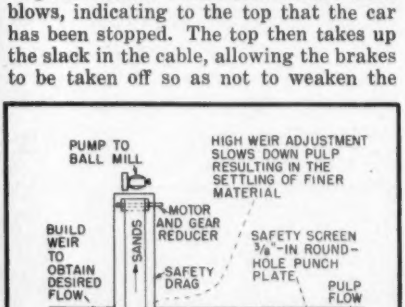
## Magnetic Brakes Increase Safety of Mantrip Car

Magnetic brakes make the mantrip car used on the slope at Consolidated Coal Co. mine smoother riding and safer. The car on which they are used carries 24 men a distance of about 1,000 ft. on a 15° incline.

Investigation showed that the standard types of braking mechanisms—safety dog, wheel drum, or drop latch—were not satisfactory for a slope this steep. They either did not stop the car or stopped it so suddenly as to cause injury to the men.

The magnetic brakes consist of two steel blocks containing electrical coils suspended under the car directly above the tracks. When the car exceeds a predetermined speed on the slope, a fly-ball governor closes the electric circuit, setting the brakes. At the same time a horn blows, indicating to the top that the car has been stopped. The top then takes up the slack in the cable, allowing the brakes to be taken off so as not to weaken the battery and thus gradually release the brakes

Provision is made for manually operating the brake switch from any point on the car.—Coal Age, Sept, p88


PUMP TO BALL MILL
HIGH WEIR ADJUSTMENT SLOWS DOWN PULP RESULTING IN THE SETTLING OF FINER MATERIAL
MOTOR AND GEAR REDUCER
BUILD WEIR TO OBTAIN DESIRED FLOW
SANDS
SAFETY DRAG
SAFETY SCREEN 3/8"-IN ROUND-HOLE PUNCH PLATE
PULP FLOW
TO THICKENERS
FLUME
TRASH REMOVED FROM UPPER END OF SCREEN

**DEVICE PROTECTS THICKENER**

**Trash and tramp oversize is removed by this device at Eagle-Picher Mining & Smelting Co. A screen is laid in the approach flume at an angle of 10°. Pulp passes through it, but wood, waste, and tramp oversize do not. Farther on is a drag operating at right angles to the flume, which removes sand that is not of correct size.—Eng & Min J, Sept, p110**

## Flat Plastic Milk Containers

Glass bottles, long the standard container for milk, and wax-coated bottles have a new competitor for milk packaging—a Vinylite plastic container developed by Sealright Co. The new container can be shipped flat, 1-million containers requiring only 1,596 cu. ft. of shipping space. Shipping cost of the new containers is 90% less than for other types of containers.

The non-toxic, odorless, and tasteless resin coating is applied to heavy kraft paper in roll form. After drying, display is applied and roll is diecut into sides, top, and bottom.

At dairy, diecut pieces are fed into a machine for assembly and sterilization. Sides, top, and bottom are heat sealed. Containers are filled with tops off, reducing foaming. Pouring is done through a corner opening to reduce spilling.—Business Wk, Sept 17, p50

## Pressure-Casting Process

Continuous pressure exerted by conventional upright hydraulic press "coins" aluminum and brass castings in steel dies. This Bacco process, developed by Budds Aero Castings, Inc., is claimed to improve physical properties by 10-40%.

Dies are built to part dimension, set in press, and filled with molten-metal. Application of ram pressure is started while the metal is entering the die cavity. It is continued and intensified until the metal has solidified. Porosity is reduced and strength increased by this coining action.

Largest casting made so far is about 4 lb. in weight. A 100-ton prers was needed. Certain automotive parts being considered may require a 3,000-ton press. —Am Mach, Sept 22, p131

## Induction Stirring Helps Arc-Furnace Steelmaking

Economic, metallurgical, and operational advantages accrue from agitation of arc-furnace heats in steelmaking. It causes intimate contact and quick reaction between steel bath and slag.

Such agitation can be obtained by induction stirring, a process developed by Asea in Sweden. It makes use of the electro-motor principle whereby a moving electromagnetic field is introduced into the hot metal to cause agitation.

The stirrer resembles a stator segment in a giant a-c. motor. Its magnetic yoke, built up of laminated steel, is bladed in the same manner as the yoke of an induction motor.

Positioned beneath the furnace, the Asea stirrer drives the melt across the whole furnace bottom from one side to the other by means of tangential forces. Borne by its own momentum, the melt returns in wide semicircle to the point where it began. Mixing takes place as the melt washes up against the sloping lining.

Tests made in Sweden revealed that homogeneity of the melt is obtained in less time with induction stirring than with normal raking. Production increases are also made possible. Induction stirring shortens melt-time by 10-15% and increases the effective charge with each melt. Total gain in production on one furnace amounted to 20%.—Iron Age, Sept 22, p73

## Polishing Bumper Steel

Polishing formed steel bumpers preparatory to plating is ordinarily a difficult and time-consuming operation. However, several companies have found that many advantages can be gained by polishing the steel in the flat with abrasive belts.

By the new method the flat steel stock is passed through a series of three to six abrasive belt machines. There it receives rough grinding, fine grinding, and final polishing. The usual copper- or nickel-buff in the series of operations is retained.

After grinding, the steel is coated automatically with a removable protective finish to prevent handling marks. After cold forming, the protective lacquer is removed and bumpers are plated.—Auto Ind, Sept 15, p35

## New Conductive Plastics

Combinations of metallic and plastic properties are usually obtainable by incorporating metal inserts in plastic parts at time of molding, by coating formed metal parts with plastic, or by metal-cladding molded plastic parts.

At times, these methods are unsatisfactory and can be replaced by use of new conductive materials that can be molded like ordinary plastics and directly plated. They have electrical resistivities approaching that of mercury.

Made by Markite Co., the conductive plastics have many promising applications: shielding, molded circuits, resistors, commutators.—Electronics, Oct, p96

**LOW-BRIGHTNESS CEILING LIGHT**

**Low-brightness cold-cathode tubes provide shadowless light in drafting room at International Engineering Co., Inc. Average intensity on drafting desks is 55-60 ft.-c., and on center reference table 40-50 ft.-c. Complete installation uses 196 lamps.—Elec World, Sept 10, p96**

# New Products

**Automatic Gear Shaver**—Model GCU diagonal gear-shaving machine and automatic loader runs continuously as long as magazine is kept filled with gear blanks. Production example: 32-tooth gear at end of cluster with 3.765 P.D., 10.5 D.P., and ⅝-in. face was shaved at rate of 191 gears per hr. at 85% efficiency.—**National Broach & Machine Co.**—Am Mach, Oct 6, p160

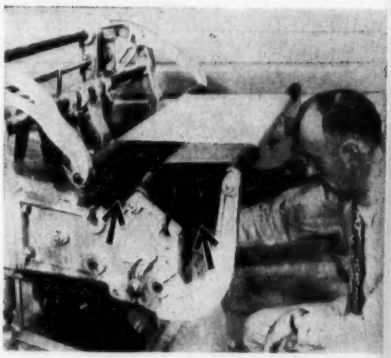
**D-c. Welder**—Plate-type rectifier d-c. welding machines have low no-load loss, 66% efficiency at full load, and power-factor effect comparable to that of induction-motor driven welders. They are available in 200, 300, and 400 amp.—**Westinghouse Electric Corp.**—Welding Eng, Oct, p76

**Horizontal Turbine**—Developing 500 bhp. at 1,750 rpm., turbine takes steam at 850-900 psi., 850° F. and exhausts into vacuum of 12 in. Hg. or against 2-psig. back-pressure. Rotor is solid one-piece wheel with blades milled in periphery.—**Whiton Machine Co.**—Power, Oct, p136

**Roof De-icer**—Homeowners need worry no longer about ice and snow on the roof. Heating cable from de-icing kit is looped around roof edge to melt channels through the ice and so allow water to drain away normally.—**Rockbestos Products Corp.**—Elec C&M, Oct, p173

**Unscrambles Containers**—Practically any type container can be handled in this straight line unscrambling table. Unit is 6 ft. long and 21 in. wide. It has 1/3-hp. motor, three conveyor belts, and discharge rate of 60-240 bottles per min.—**Island Equipment Corp.**—Food Ind, Oct, p144

**Marine Fire Pump**—New vertical marine fire pump, which meets requirements for 400 gpm. at 125 psi., is available with either electric or steam-turbine drive. Variable speeds permit unit to be used for flushing and sanitary purposes. Suction and discharge connections are located 180° apart.—**Worthington Pump & Machinery Corp.**—Marine Engrg & Ship Rev, Oct, p124



**CONTROLS CUTTING ACCURACY**

**Transparent paper bags are fabricated uniformly on this Simplex wrapping machine equipped with a General Electric cutoff register control (arrows). By direct light transmission, photoelectric control accurately aligns cutting mechanism with register marks on printed bag paper.—Elec World, Sept 24, p100**

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**Limits Speed**—Designed for service with motors, generators, and m-g. sets, speed-limiting device covers speed range of 100-2,000 rpm. It is suitable for horizontal or vertical operation. Accuracy is ±2% for higher speeds, ±5% for lower speeds.—**Allis-Chalmers Mfg. Co.**—Power, Oct, p130

**Electronic Motor Control**—Designed for applications such as conveyors, lathes, mixers, and paper-making and textile machinery, Dyna-Speed unit controls speed of fractional hp. motors. Range is 80-1,800 rpm.—**Brown-Brockmeyer Co.**—Prod Eng, Oct, p172

**Silicone Resin**—New silicone No. 9989-1 enables electrical equipment to operate at temperatures as high as 180° C. Uses: to impregnate spun glass and asbestos wire coverings and for binding coils, windings, other motor and generator parts.—**General Electric Co.**—Electronics, Oct, p208

**Fewer Parts in Classifier**—New Type H classifier features 50% fewer moving parts than other types of classifiers. Rakes follow a round-cornered rectangular path. Raking and return strokes are flat; vertical strokes form an ellipse. Oil-actuated lifting device raises rakes 12 in. or more in heavy models. Push-button control gives instant lifting.—**Dorr Co.**—Eng & Min J, Oct, p114

**Reflects Heat**—Reflective Kimsul features aluminum-foil vaporseal cover to reflect heat and shut out condensation. Bonded to cover is thick blanket of treated fiber plies to give high thermal efficiency. Tacking flanges ease installation.—**Kimberly-Clark Corp.**—Am Builder, Oct, p139

**Handles Rolls Easily**—Rolls or cylinders up to 31-in. dia. can be lifted and turned 90° from vertical to horizontal, or vice versa, by a new "upending" device. Grasping arms are hydraulically operated. Rubber-covered arms are available for loads needing protection.—**Clark Equipment Co.**—Auto Ind, Oct 1, p51

**Stainless-steel Filters**—New Oilite filters are recommended for filtering, separating, diffusing, and regulating flow of liquids and gases. They can be made by powder metallurgy with porosities from nearly zero to over 60%.—**Chrysler Corp.**—Chem Eng, Oct, p142

**Rotary Forge Furnace**—Portable, rotary-hearth furnace supplies clean, uniformly heated forgings. Atmosphere is controlled. Capacity is 900 lb. of forgings per hr., heated to 2100° F. Hearth is 21 ft. in dia. Heating time is 12-36 min.—**W. S. Rockwell Co.**—Iron Age, Oct 6, p214

**Tips Hoist Load**—Hoist attachment tips loads after they have been lifted and holds them in desired position. Tipping is done by turning a self-locking worm. Capacity is 2,000 lb.—**Manning, Maxwell, & Moore, Inc.**—Foundry, Oct, p222

**High-capacity Switch**—Designed for use in industrial distribution system, interrupter switch features arc-quenching design based on magnetic repulsion action. Roller cam provides quick make and break. Sizes are 30, 60, and 100 amp.—**Trumbull Electric Mfg. Co.**—Elec Whols, Oct, p97

**Sorting-gaging Machine**—Electronic sorting and gaging unit segregates product into categories of any dimensional width. Machine is custom-built to meet individual needs for product volume. Loading and unloading can be manual or automatic.—**Brown & Sharpe Mfg. Co.**—Iron Age, Sept 29, p38

**Filters Oil**—Called Hiltex, filter material is made of combed cotton combined with fine Sequoia bark fibers. It is approved for filtering mineral, additive and detergent type oils. Samples are available.—**Hilliard Corp.**—Prod Eng, Oct, p180

**One-man Heavy-media Plant**—Prefabricated heavy-media separation plant with a 100-tphr. capacity is run by one man. Unit produces a middling product in one operation. In a single cleaning circuit, it handles all normal sizes.—**Southwestern Engrg. Co.**—Coal Age, Oct, p114

**MASS CHECKS PARTS**

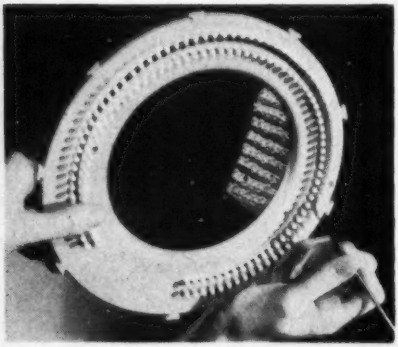
**MA-3 inspection machine handles variety of different-shaped automotive forgings—connecting rods, spindles, arms, supports. Capacity is 1,200 parts per hr. Parts are loaded on conveyor fixtures, subjected to 300-amp. ac., sprayed with fluorescent-dyed ferrous particles, then carried to inspection booth for examination under near ultra-violet light. Parts with surface defects are instantly noted and rejected by foot switch. Maker is Magnaflux Corp.—Prod Eng, Oct, p85**

# New Products (Cont.)

**Pre-lubricated Rolls**—Needle-bearing top rolls reduce roll picking and staining of stock by oils. On roving and spinning frames, lubrication is reduced to once each overhaul. Roll picking and tight winding on roll arbors are reduced. Variations in yarn size are eliminated.—**Saco Lowell Shops; Torrington Co.**—Textile World, Oct, p160

**Street Lighting**—Spherolite Jr., intended for lighting of narrow residential streets, is a shielded light source type unit with 78° main-beam angle. Vertolite mercury-vapor luminaire, designed for greater lighting requirements, is available with 16,000- or 21,000-lumen lamps.—**Line Material Co.**—Elec West, Sept, p48

**Portable Pump**—Self-priming centrifugal pump is designed for water-handling jobs where electric power or belt drive is not available. Powered by 1½-hp. air-cooled gasoline engine, pump unit weighs 83 lb., has 10-gpm. rating at 80-ft. head.—**Deming Co.**—Oper Eng, Oct, p66



MAKES KNITTING EASY

**No knitting needles or knitting experience is necessary to knit with All Plastics Corp.'s "Ezee Knitter." Of cellulose acetate butyrate, the device consists of a carrier frame with 154 pegs on each edge of a slot. Yarn is wound around each peg, using one peg for each stich, and then back over the pegs. Lower strand is lifted over other strand and finished row of knitting appears through slot between pegs.—Mod Plastics, Oct, p94**

**Medium-range Lift Truck**—New 10,000-lb. capacity lift truck employs no upright lifting columns; base moves vertically on a short column on the truck front. This design permits unobstructed vision during operation. Travel speed is 4½-6 mph. Truck is available for all-electric or gas-electric drive.—**Elwell-Parker Electric Co.**—Factory, Oct, p160

**Conveyor Scale**—Unit-type belt-conveyor scale, called Transportometer, automatically weighs, indicates, and totalizes any tonnage up to 2,000 tons per hr. Installed on any type belt conveyor, it can serve for automatic control.—**Sintering Machinery Corp.**—Chem Eng, Oct, p144

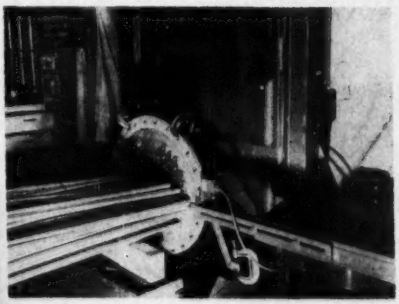
**Fluid-drive Motor**—Loads difficult to start or requiring smooth acceleration and protection from shock are suitable for single-frame fluid-drive motor. Oil cushions all shocks. Nine sizes range from ½ to 10 hp. —**Reuland Electric Co.**—Elec World, Sept 24, p124

**Roll-type Pulp Press**—Claimed to be the only machine of its kind in paper pulp field, pulp press takes pulp of usual low consistency from digesters, dewaters it, and wrings out black liquors to a resulting pulp of high consistency. Long fibers are reduced in length.—**Fulton Iron Works Co.**—Paper Ind & World, Sept, p750

**Saw Cuts High Limbs**—A lightweight electric saw mounted on a 15-ft. pole can cut tree limbs 1 ft. in dia. Used manually on the ground, it will cut limbs up to 2 ft. in dia. Saw uses 110-v. ac. or dc. For field work, a 75-w. generator is used. A lighter model saw works pneumatically.—**Mall Tool Co.**—Business Wk, Sept 24, p74

**Superheat Peeler**—Fruits and vegetables are quickly peeled by vapor peeler using superheated steam at 650-1000° F. It operates from plant's steam lines, generates own superheat. Capacity is 6 tons per hr. —**Atlas-Pacific Engrg. Co.**—Food Ind, Oct, p142

**Prevents Spatter**—Combination spatter-proofing compound and rust preventive, Protect-O-Metal No. 8, is applied before welding. It dries to transparent coating that prevents rusting up to 2 yr.—**G. W. Smith & Sons, Inc.**—Weld Eng, Oct, p9



SAWS HEAT-EXCHANGER TUBES

**Du Pont, instead of hand sawing or torch cutting heat-exchanger tubes, now uses a power band saw. Built by Wells Mfg. Co., it can saw 48-in. dia. tube bundles, 24-in. dia. stainless steel, and 12-in. dia. copper bundles. Considerable labor has been saved as previous method required three-man crew.—Chem Eng, Oct, p133**

**Ignites Coke**—Electric igniter eliminates use of wood, gas, or oil for burning in a cupola coke bed. Its operation requires compressed air and either a small transformer or welding machine. Coke is ignited by arc struck with welding rod in the igniter.—**Whiting Corp.**—Foundry, Oct, p216

**Furnace Prevents Scale**—Roto-Flame end heating furnace prevents practically all scale formation in heating for forging, swaging, and heat treating. Unit keeps ends of work enclosed in flame, thus avoiding scale. It is available in several lengths and sizes.—**Gas Appliance Service, Inc.**—Steel, Oct 10, p215

**Operates Valve**—Fluid-motor operator for gate and standard valves can be operated by water, oil, or compressed air or gas. Unit is bolted to valve bonnet and motor opens and closes valve through gearing. Sizes are 4-30 in.—**Crane Co.**—Oper Eng, Oct, p72

**Silicon Cuts Bulb Glare**—A silicon coating for incandescent light bulbs eliminates glare without reducing bulb's efficiency. Brightness is even over the entire surface; there are no bright spots.—**Monsanto Chemical Co.**—Ceramic Ind, Oct, p45

**Magnetic Clamping Device**—New clamping device employs magnetically actuated clamps to hold non-magnetic chuck for machining. Toothed edge of each clamp is in contact with work. Each clamp consists of two steel sections connected by a preset spring-steel strip. When chuck is energized, jaws are drawn to the horizontal, exerting strong lateral force on work piece.—**Hanchet Magna-Lock Corp.**—Ind Dist, Oct, p126

**Prefab Pallet Pack**—Pack is constructed of structural channel in two parts, an upright member which serves as either end or between sections and the bed member. All joints are welded. Hubs in uprights permit desired spacing for pallet underclearance, pallet size, and load requirements.—**Equipment Mfg., Inc.**—Factory, Oct, p154

**Controls Furnace Temperature**—Radiation pyrometer, "Pyrovisor," controls and records furnace and kiln temperatures to 4000° F. Temperature obtained is actual surface temperature. Response to temperature change is 99% within 1 sec.—**Bristol Co.**—Elec World, Oct 1, p29

**Skidproofs Floors**—Protective coating material skidproofs surface made dangerous because of slickness. Applied by brush to metal, wood, cement, or canvas, it is impervious to oil. Contained abrasives give positive footing.—**Plastic Coating Corp.**—Oil & Gas J, Sept 29, p97

**Lubricant Exerts Own Pressure**—A new lubricating compound "Hypermatic" is both compressible and expandible. For use in pressurized plug valves, it keeps valves 100% lubricated. Pressure may remain in plug for months. Being compressive, 50-100% more compound can be inserted in plug and stored for future use—**Rockwell Mfg. Co.**—Textile World, Oct, p156

## *FREE SERVICE TO READERS*

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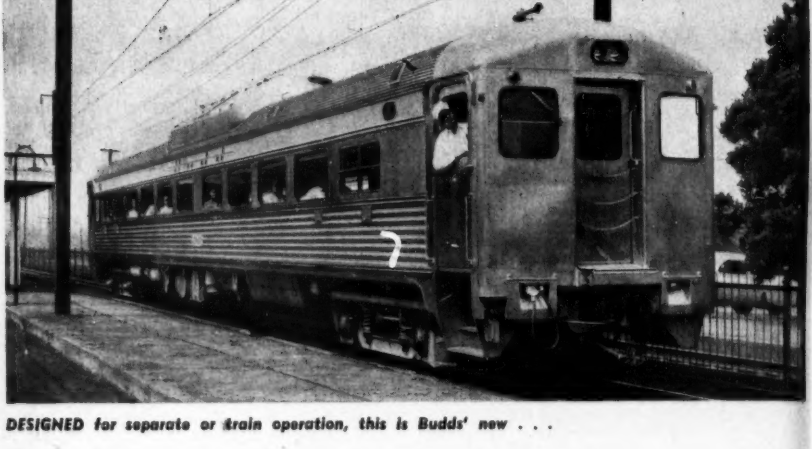


*DESIGNED for separate or train operation, this is Budds' new . . .*

# Self-Propelled Rail Car

**Car can be used separately or in trains. Power supplied by below-floor diesel engines fitted with hydraulic torque converters**

A SELF-PROPELLED, stainless-steel rail car has been introduced by the Budd Co. for service on branch lines, supplementary main-line service, or commuter lines. The 85-ft. long, 112,800-lb. car can be used singly or in trains. It is powered by two 275-hp. diesel engines with hydraulic torque converters.

Engines and transmission units, mounted just beneath car floor, are designed with the center line of the cylinders a few degrees above the horizontal. This mounting eliminates encroachment on seating space within car. Car seats 90 passengers, with toilet and electrical locker at each end.

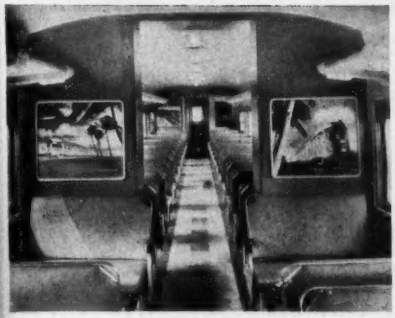
Three styles will be built. The one shown above seats 90 persons. Another will provide a 17-ft. baggage compartment and will seat 71. Third style will have a 15-ft. railway mail service compartment, a 17-ft. baggage compartments, and seats for 49.

The stainless-steel body is fabricated by Budd's Shotweld process. Sides are girders with corrugated side sheets forming webs. Outside stainless-steel surface is affixed to these sheets.

The two-cycle diesels can be placed adjacent to the axle which it drives. Lightweight engines simplify maintenance. Use of two engines per car provides greater reliability than a single, larger engine.

Cylinders are inclined 20° from horizontal. Engine develops 275 hp. at 1,800 rpm. They are supported at three points on rubber mounts and are enclosed in an aluminum box.

Torque-converter transmission was selected to save both total car weight and over-all cost. It is a combination converter and fluid coupling with a lockup clutch for direct drive so that converter is used only during acceleration. It operates up to a preset speed. Then the



*INTERIOR of 90-seat car-train*

transmission automatically locks. Upon deceleration, direct drive clutch is automatically released and torque converter is restored to operation.

Seats, specially designed, are low, eliminating need for footrests. Center lighting is with fluorescents. Incandescent reading spots, mounted under luggage racks, supplement the center-aisle lighting.—Railway Mech Eng, Oct, p543

## X-Rays Can Be Misread

Welders who have been engaged continuously at the trade for 6 years or more may be surprised when they have their chests examined by X-ray. The examination may show a "peculiar fine nodulation evenly distributed over the lung fields" according to the Lutheran Hospital in Cleveland.

The appearance is so similar to tuberculosis that differentiation on X-ray film alone would be difficult. But the cause is a condition called siderosis.

It is due to inhalation of iron particles and their deposit along the pulmonary vessels into lymphathic channels and also in the lymph nodes.

Siderosis does not lead to physical disability. It is not a hazard to the health of a welder. But unless correctly diagnosed, it can lead to worry and unnecessary expense.—Weld Eng, Oct, p46

## Method Measures Solid:Gas Ratio in High-Solid Flow

An electronic method has been developed to measure the instantaneous soild: gas flow through a tube when the solid is about 20% by volume. The research was a joint effort of U. S. Bureau of Mines and West Virginia University.

The device, developed particularly for coal, does not measure the flow rate of the solid. Instead, it measures the change in dielectric constant of the coal-air mixture as it flows between plates of a condenser.

Measurement of the electrical property gives high response speed. By using an oscilloscope as the recorder, there is no time lag and any variation of the measurement with time is recorded.

Any mixture of pulverized solid and gas can be checked as to uniformity of mixing with the instrument, provided that solid concentration is high enough to cause a measurable change in dielectric constant. Greater sensitivity of the instrument can be gained by increasing condenser length or amplification ratio or by decreasing inductive coupling between oscillators.—Chem Eng, Oct, p128

## Reclaims Radio-Tube Bases

Radio-tube rejects are being reclaimed profitably by one large manufacturer. Induction heating and good fixturizing enable one operator to reclaim 3,600 nickel-plated brass and aluminum bases in 1 hr.

The adhesive joining metal base, glass envelopes, and tube elements is broken away from the base by the rapid expansion obtained from a short heating cycle at a high power level. Heating is done in an air-operated rotary fixture which also ejects tube elements and reclaimed tube bases. Cycle is only 1 sec.

The induction unit is a 10-kw., high-frequency generator operating at 375 kc. —Iron Age, Sept 29, p70

## Canada's A. V. Roe Jetliner Impressive in Test Flight

A. V. Roe (Canada) Ltd.'s short-to-medium range Jetliner XC-102 proved highly successful in recent flight tests. Parts are on hand for a second prototype, but assembly will be delayed until lessons learned from the first can be incorporated. The second probably will be ready for service within a year.

Plane's maximum cruising speed is expected to be 417 mph. at 30,000-35,000 ft. Stalling speed at 50,000 lb. with flaps down is 87 mph.; at 40,000 lb. weight, it is 78 mph. Range with 50 passengers is 500 mi., allowing for stacking (circling to land), landing and takeoff, alternate and instrument approach. Maximum still-air range will be about 1,400 mi.

In flight the plane is quiet. Said one engineer, "Sound and vibration conditions are so satisfactory that immediately after takeoff, with undercarriage retracted and fairing doors closed, the sudden drop in noise level and vibration are so pronounced that one experiences the sensation normally associated with complete power loss in piston-engine craft."

Low-wing configuration with the four nacelles underslung makes ground maintenance simplier.—Aviation Wk, Oct 3, p15

## Continuous Juice Evaporator

A new-type, high-vacuum, low-temperature concentrator has been installed by Real Gold Citrus Products Co. It utilizes a continuous, automatically controlled flow principle to concentrate citrus juice.

The concentrator accomplishes a triple-effect evaporation. In the first effect, fruit juice enters the top tube sheet and falls in a thin film inside tubes. Latent heat of evaporation is given up to the juice; this releases vapor which is transmitted to the second effect where it becomes the heating medium.

The partially concentrated juice then passes through the second and third effects and at 60° Brix to the blender for mixing with 13° Brix juice before freezing. Final product is 42° Brix.

Both the heat and cold needed are developed by a centrifugal compressor of the type used to air condition buildings Driven by a 250-hp. synchronous motor, the compressor is entirely self-contained. —Food Ind, Oct, p76

## Speeds Up Coal Unloading

A slice bar has increased the rate of unloading coal from hopper cars at Rochester Gas & Electric Corp. Increase is 240% over bucket method and 400% over manual unloading.

The bar is a 3-ton steel plate of nearly car width. Operated by an overhead crane, it works the coal down to the hoppers. It also is used to clean the bottom of the car. Present coal unloading rate is as high as 47½ tons per man-hour.—Elec World, Sept 24, p102

SPEEDS ASSEMBLY

Stick of identical screws feeds into this pneumatic rotary-electric screw driver, eliminating picking up of each screw and starting each one by hand. Screws twist off when predetermined torque is reached. Tool accommodates screws from No. 0-4. They may be used in spiral or hand-rachet drivers.—Factory, Oct, p38

## Homopolar Generator Made to Supply Dc. to Cyclotron

Generation of large amount of dc. at low voltage is possible with a homopolar generator. This machine is essentially a two-pole generator with its armature windings so arranged that they always cut lines of unidirectional flux. Dc. is taken off armature collector rings.

But in the past, problems of poor voltage regulation, internal heat, and short brush and bearing life made such a generator impractical. Now, Electric Products Co. has built a homopolar generator that appears practical.

The 30-ton machine, 13 ft. 8 in. high, has a 600-hp. motor on top. It produces 21,000 amp., 18.7 volts at 1,200 rpm. Lengthening collector bars allows it to deliver 100,000 amp.

Brushes are water-cooled, thus permitting a higher-current density. Entire rotating system is carried on two roller thrust bearings. Flux is diverted from its usual path to set up a magnetic lifting force and ease the load on the lower bearing.

The generator will supply dc. to the new synchro-cyclotron at Carnegie Institute of Technology. Advantages expected to be gained include a large saving in floor space, lower first cost, and economy in operation and maintenance.—Power, Oct, p107

## Cheaper Color Photoprints

Handmade 8x10-in. photoprints cost between $5.75 and $65. Dye-Trans Color Photo, Inc., says its new process will turn them out for $2 per print in dozen lots. The reason: a new machine using electronic controls, improved dyes, and mechanical handling.

An electronic scanner and densitometer supplant color filters and eyesight in matching colors. Color variations are held to 1% compared to 25% by conventional methods. Print dyes—the type used for "fast" fabrics—prevent early fading. Dye strength is held to changes of 1% by electronic controls.—Business Wk, Sept 24, p70

**OIL-DRUM TIPPING STAND**

**This oil-drum tipping stand was fabricated from discarded 3-in. drill pipe for base and sucker rod for cradle and handle. Stand tips easily and spillage is reduced. Chain is hooked from top of steel bar to V-plate at rear to prevent accidental tipping.—Cons Meth & Equip, Oct, p53**

## Furnace Anneals Tank Cars

An annealing furnace for handling railroad tank cars has been built at the Pressure Welding Div., General American Transportation Corp. The furnace can accommodate a vessel 16 ft. in dia. and 50 ft. long, two car tanks side by side, three 16-ft. spheres 1 in. thick, or a 75-ton load.

The furnace is gas-fired with a burner capacity capable of bringing the furnace and a 75-ton load to 1600° F. in 3 hr. Maximum gas consumption is 30-million Btu. per hr. The furnace also can anneal stainless-steel vessels at 2300° F.—Iron Age, Sept 8, p85

**INDICATOR FOR CAGE HOISTING**

**Shadow on a horizontal board beneath hoist cable with numbered strips indicates floor at which cage is stopped. Strips were painted after hoist was installed, and position of cable for each floor was ascertained.—Cons Meth & Equip, Sept, p57**

## Photocell Measures Gas

Previous to the advent of the photoelectric cell, there existed no means for automatic periodic measurement of the concentration of hydrogen sulphide. Noxious qualities were recognized, but the low concentrations producing them were hard to measure.

Using photoelectric cells simplifies the operation greatly. A white tape impregnated with lead acetate, glycerin, and acetic acid is placed in the path of the gas. The hydrogen sulphide combines with the chemicals on the tape, forming brown lead sulphide.

A light is cast on the stain, and the reflection picked up by a differential photometer which feeds into a continuous recorder. As the intensity of the reflection varies because of change in brown color, the difference is recorded. When the preset period is over, the machine disconnects itself, leaving a permanent record of the hydrogen-sulphide concentration.—Electronics, Sept, p85

## Product Design Shorts

Among new ideas is a storage battery with twice the cranking efficiency of present types at −40° F. Improvement is due to vaporized lead oxide as the active plate material and to ultra-thin plates that increase available plate area.

Another idea is a sheet-metal testing method under discussion by American Society of Testing Materials. The test subjects sheets less than 0.005 in. thick to bulging rather than to tensile testing. Quality control is better.

Another new test, this time on air contamination, is made by a device with a tapered jet that samples air continuously. Dust particles are deposited on a revolving glass disk calibrated for any desired period.—Prod Eng, Oct, p3

## Sandwich-Wall Textile Mill

Cocheco Woolen Mfg. Co., is the first textile mill in the country made of insulated panel sandwich-walls. Walls were cast in-the-flat at the mill site and raised into position after hardening.

The installed cost of the paneling was about $1 psf. less than brick wall construction. Paneling weighs ½ as much as masonry wall, but insulating values are several times higher than those of usual construction materials. Building this type of structure is much speedier than older methods and promises to be still faster after the contractors have acquired more experience in installation.—Textile World, Sept, p138

# New Markets for Wood Wastes

**Sawdust, thermosetting resin, chemical additive, and filler result in a product matching natural woods in properties but less costly**

WOOD WASTES bonded with resins have been used to date mainly for large-area structural boards for cabinet making or for wall board and construction sheathing (see McG-H Digest, May, p31). Scientific Creators, Inc., has developed many other household items to be sold under the tradename Xon—shoe lasts, hamper tops, coat hangers, toilet seats, plaques.

Ingredients will be sawdust, a thermosetting resin—phenolic, urea, melamine, resorcinal, or a mixture of more than one type—chemical additives, and fiber or cotton fillers. The additives promote good flow. Formulations vary with resin content, ranging from 3-25% depending on desired strength, type of waste, resin, and fillers used, and moisture content.

Wood waste is never preconditioned, the adjustments for variations being made in the resins used and in press pressures. Moisture content ranges from 5-20%. Occasionally the compound is preheated before being poured into cavities.

Mixing is in a standard chemical mixer, but best results are obtained by rolling the mix. Dyes may be mixed with other ingredients. Molds are said to be cheaper than those for thermosets.

Dry mixture is packed into molds by hand. From this point on, the process is the same as in standard compression molding. Pressures range from 500-2,500 psi. and temperatures from 225-275° F.

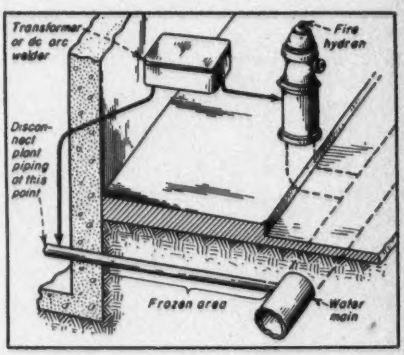
The company has produced 300,000 toilet seats by this method. The core is covered with a pearlescent cellulose nitrate finish. Company hopes to produce 750,000 hamper covers, to be covered with the cellulose nitrate material. Both wishbone- and wardrobe-type hangers are to be produced in the same manner at the rate of 1-million per year.

All products made can be drilled with standard woodworking tools. They work more easily than natural wood because of the uniform density.

Coverings tried successfully, in addition to the pearlescent material, have been rubber, foil, printed papers, leather, and veneer. All are cemented in place.

Heavy-duty shoe lasts are being machined from the wood-waste compound because of the range of shoe sizes and styles and economies of carving from wood-waste blanks.

Wide range of densities of materials make cost comparison difficult. But considering comparable densities in both natural wood and resin-bonded wood, the latter is less costly—and at times only half as costly. Prior to application of the pearlescent finish, resin-bonded core cost is 40% below that of natural wood. —Mod Plastics, Oct, p90




**THAWS WATER PIPES**

**Passing electric current through frozen water pipes generates heat, melting the ice along inner surface. Flowing water then quickly melts remaining ice. Stepdown transformer or d-c. arc welder is connected as shown. Current varies from 75-800 amp. for pipe of ¼-6 in.—Oper Eng, Sept, p48**

## L-Shaped Hardening Furnace for High-Speed Steels

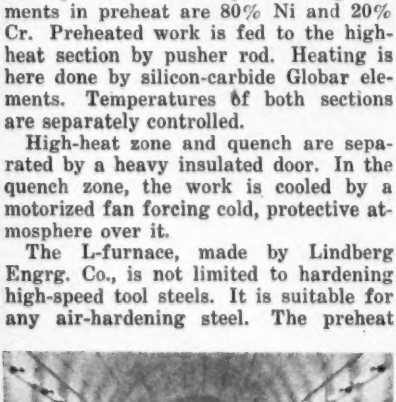
Bright hardening of high-speed-steel tools, with complete freedom from carburization and decarburization, is claimed for a new L-shaped furnace. Its design is supposed to keep the controlled atmosphere under control.

The furnace consists of preheat, high heat, and quench sections built into one complete unit. The preheat section is at right angles to the high-heat section.

Work is charged to preheat through a flame-protected doorway. Heating elements in preheat are 80% Ni and 20% Cr. Preheated work is fed to the high-heat section by pusher rod. Heating is here done by silicon-carbide Globar elements. Temperatures of both sections are separately controlled.

High-heat zone and quench are separated by a heavy insulated door. In the quench zone, the work is cooled by a motorized fan forcing cold, protective atmosphere over it.

The L-furnace, made by Lindberg Engrg. Co., is not limited to hardening high-speed tool steels. It is suitable for any air-hardening steel. The preheat section can be used separately for hardening oil- or water-hardening steels. Other possible uses are bright copper brazing, silver brazing, and annealing. —Iron Age, Oct 6, p86



**LONDON UNDERGROUND**

**Modern subway station in London has daylight-quality illumination with fluorescent daylight lamps. "Warm" color creates comfortable atmosphere. Two independent power supplies insure light in case of breakdown.—Elec C&M, Oct, p130**

## Oils Aid Fast-Color Work

Oils and oil emulsions increase cohesion of thickener mixtures in fast-color printing of vat and stabilized azoic dyestuffs. Better cohesion results in better penetration of dyestuff into fiber.

Olive oil may be added to thickener during the boiling period. Whale or sperm oil may be added to thickeners already prepared, or even to print pastes when trouble is encountered in printing sulphonated emulsions such as oleins. Equal portions of the oils are mixed until emulsion suspends readily in water.

Printing oils usually lubricate the paste during printing operation. Paste is applied to engraved roller from colorbox by a furnishing roll. Surplus color is removed by "doctor" blade. Some lubricant must be applied between edge of blade and roller. Lubricant can be carried by print paste.

Sulphonated oils may tend to increase frothing of print pastes. Frothing reduces flow of paste, causing a reduction in volume of paste transferred to cloth. Pine oils with high terpene-alcohol content reduces frothing in vat and chrome-mordant dye pastes.—Textile World, Oct, p143

## Easy-to-Machine Electrodes

Building up of undersized parts that have to be threaded on the deposited material is simplified by arc welding with low-hydrogen type electrodes, AWS E-6015. In each case preheating is required. There is no evidence of tearing at the peak of the thread on the built-up section, and machinability is excellent. Care has to be exercised so the heat does not greatly exceed the preheat temperature.—Welding Eng, Sept, p42

## Synthetic Zeolite Dried in Outside Drying Beds

Making synthetic zeolite for water softening—50-million lb. a year—is a big business. Half of this amount is made by Culligan Zeolite Co. at San Bernadino, Calif., where temperatures range up well over 100° F. with 5-10% relative humidity.

Zeolite, a sodium-aluminum-silicate gel, is made by reacting 50% caustic soda with bauxite at 245° F. to form sodium aluminate, then reacting this product with sodium silicate to form the zeolite.

The latter reaction is made in an unusual manner. Sodium aluminate is put in one compartment of a two-compartment tank truck and the silicate in the other. The truck is driven to a truck-mounted rig out on the 37-acre concrete drying bed near the plant.

Chemicals are pumped to the pouring rig, which mixes them in proper proportions and pours the mixture out the back end onto the concrete bed. The zeolite, 6 in. thick, dries in 2-5 weeks, depending on the season of the year. When completely dry, it is swept up, loaded into dump trucks, and taken to the mill for screening, milling, washing, and bagging. —Chem Eng, Sept, p92, 140

## Reinforced Plastic Trays

Reinforced-plastic bakery delivery trays 25¾ in. square by 1¼ in. deep have replaced slightly larger plywood trays at Purity Bakeries. Previous wood trays could not be washed, screws became loose, splinters were a hazard to delivery men. New trays are steam-cleaned. Smaller depth gives an extra 50 sq. ft. of space per ½-ton delivery truck. Plastic trays cost 17% more.

New tray is a lay-up of polyester-bonded Fiberglas mat, precast to size. Fiberglas card is molded into top of sides for added impact resistance. Lay-up is placed in a cavity mold, a measured amount of resin is poured in, and mold is closed. It is molded under a 40-ton pressure for 2½ min. The only finishing necessary is filing of flash.—Mod Plastics, Oct, p69

**BENCH AIR RIVETER**

**Small sealing clip on Sangamo Electric Co. Type JA meter is riveted on a bench fixture. Air cylinder with 3-in. stroke is actuated when workpiece closes one switch under cylinder support plate and operator closes a second switch with his left thumb. Both hands are kept clear of danger area.—Am Mach, Oct 6, p121**

## Seals Boiler-Wall Corners

Corner joints of a wall in two boilers at Philadelphia Electric Co. have been sealed with a new silicone rubber-covered Fiberglas material. Corners were sealed from top to bottom with the material, which was cut to an 18-in. width.

Attachment was made by bolting in place with 2-in. strap iron. No gasketing was needed because the material is compressible and resilient and acts as its own seal.

Made by Connecticut Hard Rubber Co., the material is ⅛ in. thick, resistant to high temperatures, not subject to corrosion, and light and flexible.—Elec World, Oct 8, p118

## *How To Cut Costs*

# About Cost Cutting Next Month

**Cost reduction is a management problem. It is today management's most urgent problem. And it is to managements trying to find solutions to fit their industries that we direct next month's report to management—24 pages of timeliness.**

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Of McGraw-Hill Digest published monthly at New York, N. Y., for October-1, 1949

State of New York
County of New York ss.:

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill International Corporation, publishers of McGraw-Hill Digest, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semi-weekly or tri-weekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

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J. A. GERARDI, *Secretary*

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Sworn to and subscribed before me this 16th day of September, 1949.

ELVA G. MASLIN

Notary Public, N. Y. Co. Clk's No. 2020. Reg. No. 480-M-O

(My commission expires March 30th, 1950)

# Production Ideas

## from Manufacturers' Catalogs

**12-1 Grinding Equipment**—20 and 28 p. Norton Co. Catalog 1843-8 illustrates the complete line of grinding and lapping machines. Catalog 1052-16 gives specifications on grinding wheels, price lists, and recommended tool-grinding setups.

**12-2 Industrial Paints**—28p. U. S. Gutta Percha Paint Co. How to increase production and lower maintenance costs by "Engineered Painting" is described.

**12-3 Bearings**—112p. Link-Belt Co. Catalog No. 2550 is a data book on ball and roller bearings. It gives construction features, list prices, weights, load ratings, and all necessary dimensions.

**12-4 Core-drill Equipment**—36p. Joy Mfg. Co. Bulletin D-18 covers auxiliary core-drilling equipment. Specifications are given for core barrels, bits, drill rods.

**12-5 Geon Polyvinyl**—16p. B. F. Goodrich Chemical Co. Bulletin introduces the various types of Geon materials, compounding, processing, and end uses.

**12-6 Cut Metalworking Costs**—20p. Hydraulic Press Mfg. Co. "Case Histories in the Reduction of Metal Working Costs" shows how 17 manufacturers were able to save money.

**12-7 Welding Equipment**—84p. Marquette Mfg. Co., Inc. Complete welding catalog includes price lists, both arc and gas welding equipment, and all types of accessories.

**12-8 Cold Roll Forming**—86p. Yoder Co. This book is an illustrated story of the equipment and process of cold roll forming and the varied uses of its products. There are valuable sections on tooling, maintenance, and accessories.

**12-9 Plastics**—20p. Plastics Div., Monsanto Chemical Co. Bulletin describes available plastics, their advantages, and their uses with much valuable detail.

**12-10 Stainless-steel Handbook**—128p. Eastern Stainless Steel Corp. Covers processing, fabrication, and tables of physical properties, chemical composition, and reference data.

**12-11 Chemicals** — 60p. American Cyanamid Co. "Products and Services for Industry and Agriculture" describes the many chemicals offered for those purposes. Example: plastics, mineral dressing, organics, fertilizers, weedkillers.

**12-12 Materials Handling**—32p. Rapids-Standard Co., Inc. "Material Flow at Work" discusses the principles of keeping goods in motion with least effort. It shows case histories of good materials handling.

**12-13 Color in the Plant**—32p. E. I. du Pont de Nemours & Co. (Inc.). Color Conditioning for Industry" tells how to obtain the benefits of color in the plant—better seeing conditions, higher output, fewer accidents.

**12-14 Construction Tools**—120p. Worthington Pump & Machinery Corp. Blue Brute line of equipment is covered, including portable compressors, air tools, drifters and stopers, mixers, pavers, pumps. Full specifications are given.

**12-15 Electrical Insulation** — 36p. Owens-Corning Fiberglas Corp. Manual discusses glass-base electrical insulating materials. Comparative test data will be appreciated by engineers.

**12-16 Memorandum Tariff 1-4**—24p. Transcontinental & Western Air, Inc. TWA gives valuable rules, regulations, rates, and charges on international air cargo between U. S. and points served by TWA.

**12-17 Memorandum Tariff C. C. 6**—72p. Pan American World Airways System. Book covering rates, charges, regulations guides the air-cargo shipper on service between U. S. and cities served by Pan American.

**12-18 Power-supply Diesel**—32p. Waukesha Motor Co. Bulletin No. 1496 covers Enginators, which provide power for railway passenger cars. They are applied as prime power source or for stand-by service.

**12-19 Process Instruments** — 32p. Foxboro Co. Bulletin No. 427 gives details on Dynalog instruments for process measurement and control.

**12-20 Synthetic Lubricants** — 28p. Carbide and Carbon Chemicals Corp. Booklet 6500 describes Ucon lubricants for machinery, gears, engines, and many other applications.

**Please use coupon on next page**

# Production Ideas (Cont.)

**12-21 Pneumatic Tools**—32p. Ingersoll-Rand Co. "Air Power, the Key to Lower Production Costs" illustrates air-powered tools and shows applications.

**12-22 Chemical Products** — 75p. Tennessee Eastman Corp. Annual catalog describes chemical line with specifications, applications, and containers for each entry.

**12-23 Glass Blocks**—40p. Pittsburgh Corning Corp. Catalog 81700 gives technical data on glass blocks for building purposes and shows how to select correct patterns.

**12-24 Chains, Slings**—32p. American Chain & Cable Co., Inc. Bulletin gives properties, specifications, and load-limit calculator charts on chains, slings, hooks, rings, and links.

**12-25 Transmission Belting**—28p. U. S. Rubber Co. Catalog covers flat belting with special attention to analyzing drives and using endless belting.

**12-26 Making Steel**—100p. United States Steel Corp. Book "Steel Making in America" describes in simple yet extremely effective language how steel is manufactured in the U. S.

**12-27 Threading Tools**—48p. National Acme Co. Catalog D-49 describes Vers-O-Tool automatic heads for hollow milling and threading. Heads use circular and blade chasers.

**12-28 Industrial Chemicals** — 175p. Allied Chemical & Dye Corp. Book No. 8915 gives history, application, properties, grades, and packing and shipping instructions for all its industrial chemicals.

**12-29 Industrial Insulation**—40p. Johns-Manville Corp. Catalog GI-6A tells the story of insulation. Specifications are given on all types of insulation materials, refractories, Transite pipe, packings, gaskets, roofing, flooring, electrical materials.

**12-30 Chains and Sprockets**—40p. Diamond Chain Co., Inc. Catalog No. 709 describes the enlarged line of stock sprockets and single- and multiple-strand roller chains. Design data will help the engineer.

**12-31 Sheet and Heavy Steel**—104 and 108p. Republic Steel Corp. These two books, 816-5M and 817-5M, are more than catalogs. They show how steel is made and how it is processed to meet customers' needs. They give complete specifications on a wide variety of sheet, strip, galvanized, and heavy products.

**12-32 Welding Electrodes** — 44p. Harnischfeger Corp. Booklet gives specifications for arc-welding electrodes for hard-facing, and for stainless, alloy, and mild steels.

**12-33 Diesel Lubrication**—114p. Texas Co. Booklet describes relation of fuels and lubricants in operating efficiency of diesel engines.

**12-34 Heat-treats Stainless**—36p. Armco Steel Corp. Booklet discusses practices and equipment for heat-treating stainless steels, plus surface hardening and pickling.

**12-35 Foundry Ladles**—40p. Whiting Corp. Catalog FY-163 covers full line of ladle equipment. Specification tables will be of interest and value to iron and steel production men and purchasing agents.

**12-36 Aluminum Finish** — 124p. Reynolds Metals Co. "Finishes for Aluminum" tells how to apply desired finishes to aluminum and discusses characteristics of the various types of finishes.

**12-37 Gylcol Ethers**—42p. Dow Chemical Co. Catalog contains physical and use data. It has 20p of graphs on vapor pressures, densities, viscosities, other properties.

COPIES of these manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 W. 42nd St., New York 18, N. Y., U. S. A.

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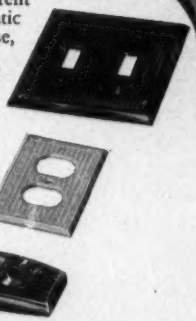

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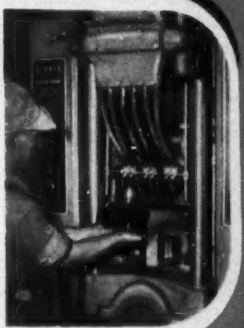

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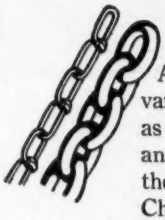

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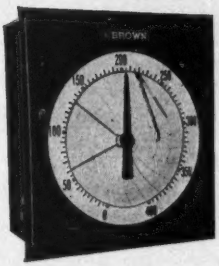
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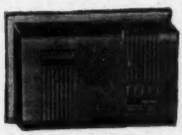
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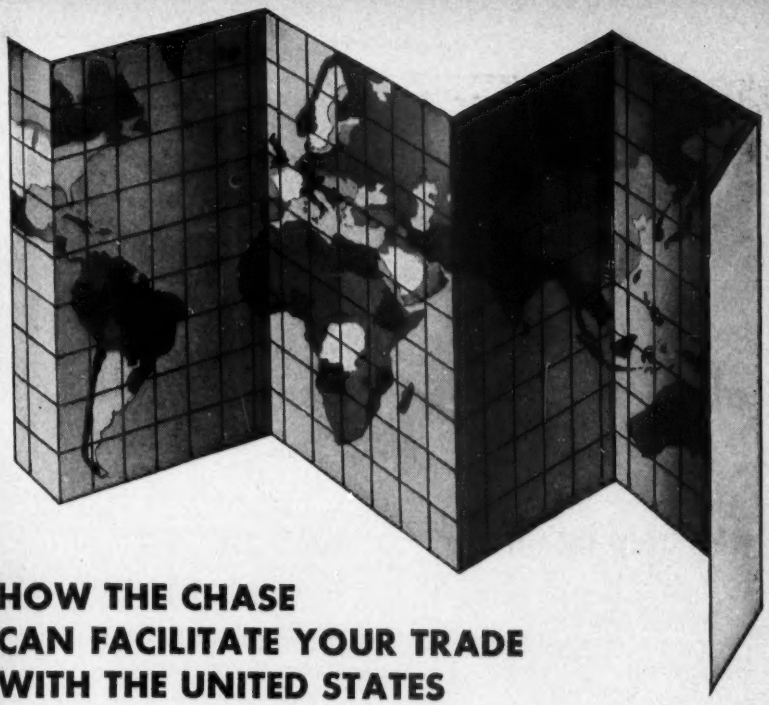

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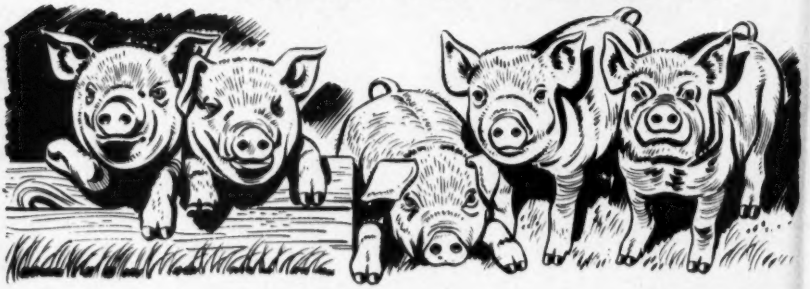

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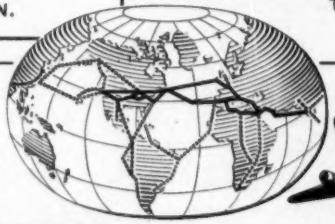

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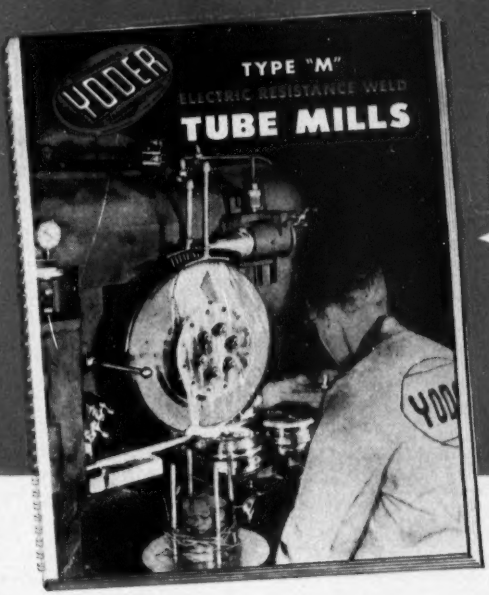


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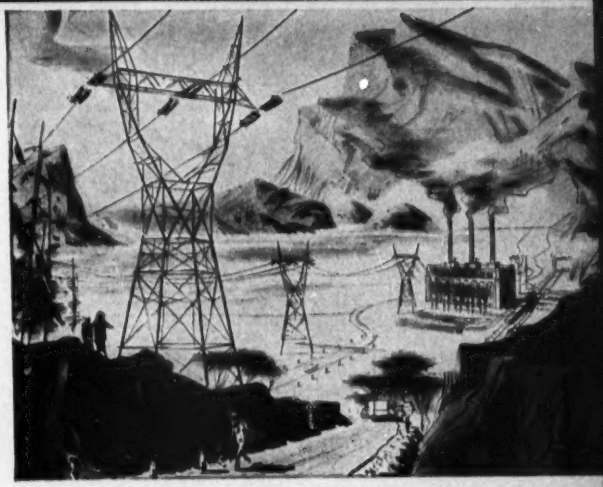

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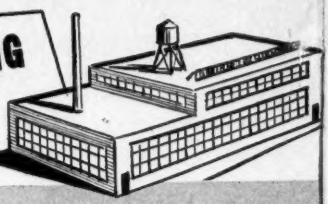

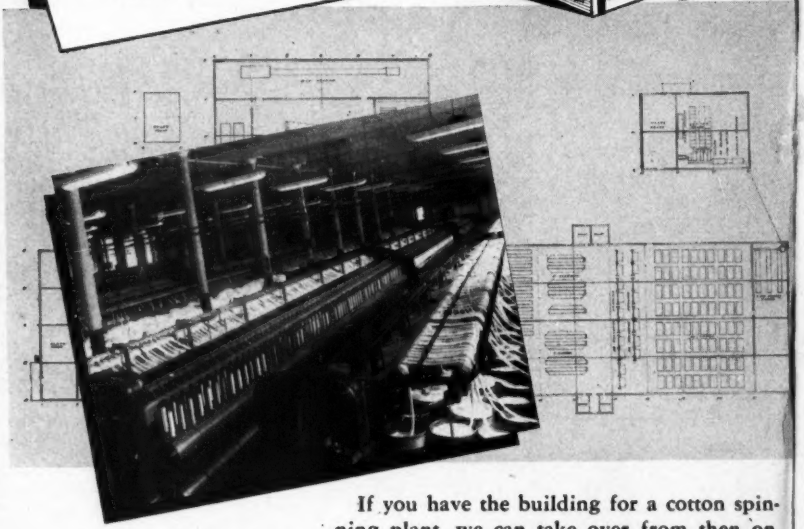

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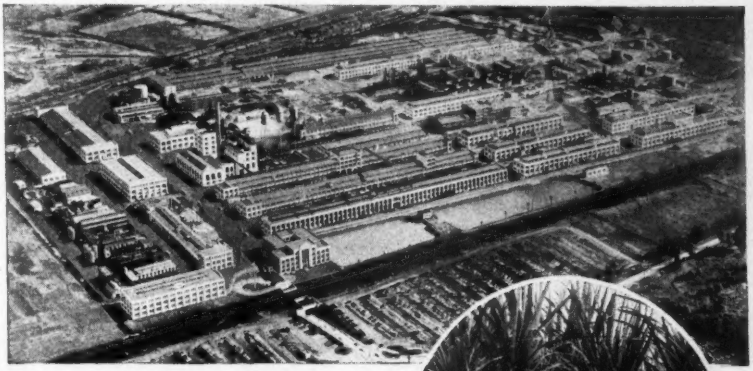

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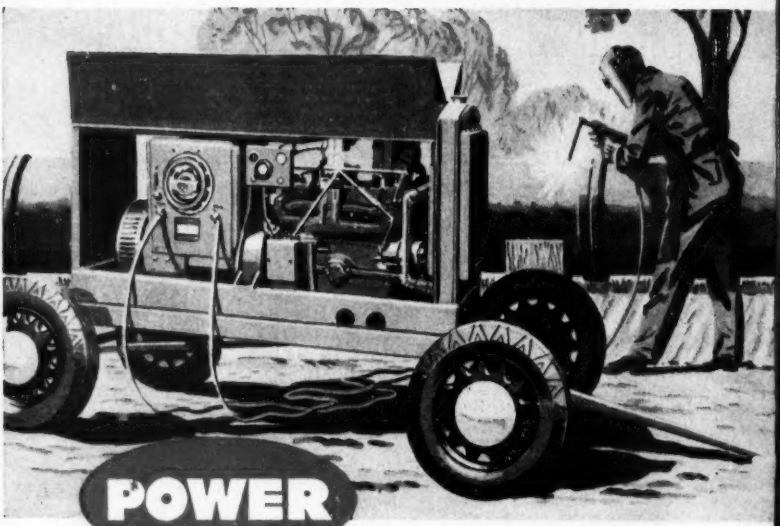


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